"Looking after Children with Autism - A Handbook"

2nd Edition

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Brain & Spine Institute
Centre for Stem Cell Therapy and Neurorehabilitation
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This book is basically a compilation of information / literature on the available on the topic, from various sources (which have been acknowledged duly). However, this is by no means an exhaustive resource, since the field is evolving at a very rapid pace. Every effort is made to ensure accuracy of material, but the publisher, printer and author will not be held responsible for any inadvertent error(s).

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This book is dedicated to
all the courageous and loving
parents of children with autism.

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He setup the Stem cell and Genetic research laboratory at the LTMG hospital & LTM Medical College which was the first of its type in Mumbai. He has also created India's first dedicated Stem Cell Therapy and Neurorehabilitation center in Navi Mumbai. He is a staunch believer that Stem cell therapy can relieve a lot of human suffering of neurological patients and makes every attempt to popularize this new approach amongst the medical community. He is one of the very few people in the world who does psychosurgery which is a form of brain surgery for people with intractable psychiatric problems. He is also done pioneering work in various forms of minimally invasive Neurosurgery such as Stereotactic surgery and Neuroendoscopy.

He has done innovative work in the field of spinal surgery and Neurotrauma and has a special interest in Revascularization Microvascular surgery for cerebral ischemia. He has a special personal interest in Neurobiology of the mind and lectures extensively on the relationship of the brain/ mind to health and disease. He is a strong advocate of the role of yoga, meditation, natural therapy and diet in the prevention of various modern illnesses. In summary: He is a Neurosurgeon, Medical Teacher and Scientist who is attempting to combine the best of science, medicine and humanity to make a difference to the lives of people who are suffering from neurological disorders.

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For the **"Looking After Children with Autism - A Handbook"**
(Marathi Edition)

Preface

Parenting a special child is one of the most challenging and demanding tasks for a family to manage. Children with autism appear like any other children and yet have certain limitations that need special attention and looking after. Whereas doctors, therapists and special educator play a major role in assisting the child overcome their limitations, the final onus of integrating these children into main stream life is obviously with the parents. We at Neurogen believe that well informed and empowered parents can make a big difference to the lives of children with autism. Since parents sometimes find it difficult to understand medical and technical terms, we decided to bring out this handbook which has been written in a very simplified manner for any parent to understand. Understanding exactly what the medical problems are with their children as well as understanding how different therapies and treatments work, gives parents the ability to identify and implement treatment programs that are best suited to their child. The last few years has seen a major explosion both in research in autism as well as the availability of newer and advanced technologies that can be used as treatment. In this book we have explained many of these new technologies as well so that parents can make an informed choice about what is best for their child. At Neurogen we have seen some dramatic improvements in the majority of our children with autism using a combination of paediatric neurorehabilitation therapies (Occupational Therapy, Sensory Integration Therapy, Physiotherapy, Speech Therapy, Applied Behaviour Analysis, Art Based Therapy, and Special Education) combined with state-of-the art medical technology (Stem Cell Therapy). We understand that making a choice as to whether one should opt for using advanced medical technologies can be a difficult one for parents and we hope that the information in this handbook helps them to make appropriate informed choices.Those parents who wish to read more may refer to our more detailed 400 page book "Parent & Teacher guide book for Autism", a free copy of which can be downloaded from www.neurogenbsi.com

We wish you all a happy reading and hope the information you gather from this handbook will help transform your child's life.

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A Parent's Perspective

It was a snowy January night in London, when my son 'RM' was eighteen months , I discovered a wrong impression , 'he suddenly stood up on his cot and started giggling'……constant giggling for approximately twenty minutes.

I immediately searched on the web and found nothing much for an eighteen months old child. It was too early to comment & label the child.

From the Start 'RM' was fussy with feeding & sleeping. I remember early on , my mother commented that RM would not reach or point for anything . I wasn't worried, and thought nothing of her comments until much later.

At the age of twenty months, when we attempted to feed RM cereal or fruits , he puked.
For the next few months we attempted to feed him different types of food, but he would gag & vomit until we started working on his GFCF/SF diet. I felt something was off, but our General Practitioner was not yet concerned. I don't believe I was consciously in denial about RM's delays.

This changed over the next several months, as each day brought new struggles. Feeding RM became a desperate daily act and play schooling wasn't helping.
Till this time he was not responding to his name consistently, all eye contact ceased, and a very few words at his terms.

My concerns and intuitions were confirmed when the first of many developmental experts came to our home to evaluate RM and gave ideas about Global Developmental Delays.

I still denied. Meanwhile, I was already pregnant with my second child, a boy. I began to have a constant sinking from my throat to the pit of my stomach. I had no idea what Autism looked like. This term was Alien to me, when I first heard it from a non-expert but a Doctor.

I went online and spent many nights frantically researching early childhood autism. It suddenly struck me…
My son was Autistic.

As abruptly as I realized RM had autism, I collapsed into devastation and grief. For months I cried all the time , I stopped socializing completely. I was nauseous and couldn't sleep. RM was not yet formally diagnosed. Still we started private & government, all kinds of therapies for RM but not much improvement.

We needed help. He needed help.
RM's behavior continued to get worse sometimes. A typical day involved hours of his crying, gagging and feeding. I felt helpless. I was unable to provide him comfort and that broke my heart.

I was in a dark, heavy, seemingly impossible place in which I truly believed was harder to raise him. I would literally wakeup in the mornings with my heart pounding. At times, the anxiety manifested into Panic attacks. I dreaded everyday. From that desperate place, I finally got to the point where I realized why should I change my son, so I had to work on myself. I began to seek outward so that I could heal inward.

As I started my journey into healing and rebirth. From mum, to a mum of a child with special needs. I restarted meditation and 'the Art of Living' Yoga. My son woke me up when I started to become unconscious. He reminded me as I faced his massive behaviors' and challenges, I needed to stay present, conscious, and calm.

As a result, I began a practice where the louder and more severe his behavior became, the calmer and more understanding I became. I stayed present to support him, and here my parents, siblings & husband stayed present to support me.

I learned to wait. Those rough moments always passed and I would get may be ten minutes of relief before the next rough wave began. Again it would pass. When I reflect back on how I got to a place of desperation and suffering. I believe much of my misery was rooted in my perceived inability to make thoughtful, empowered and meaningful choices about my perspective.

I am now happier and more fulfilled than I have ever been. Overtime RM also experienced a positive shift. His vomiting stopped and he started chewing food. He developed through his own growth and rebirth into a much more joyful child. When he looks into my eyes . It's a feeling I've never had with another human being. It's as if his soul sees my soul.

But travelling from expectations to acceptance took years for us because we lacked a repository of information about Autism. This is why this handbook is introduced by Neurogen BSI to help parents and care givers to move out off the dilemma, pinpoint where and what help your child needs.

CELEBRATE NEURODIVERSITY, BECAUSE EVERY CHILD IS WORTH CELEBRATING!!

By Anu M ***(mother of a child with special needs)***

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Author's Publications in field of Neurodevelopmental Disorders

A) AUTISM:

1. Sharma A, et al., The baseline pattern and age.related developmental metabolic changes in the brain of children with autism as measured on positron emission tomography/computed tomography scan. World J Nucl Med 2018;17
2. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Sarita Kalburgi, Ridhima Sharma, Prerna Badhe, Samson Nivins. PET CT Scan Brain As A Monitoring Tool To Study The Effects Of Autologous Bone Marrow Mononuclear Cell Transplantation In Autism Spectrum Disorder. International Journal of Current Advanced Research. Sep 2017 (In Press).
3. Alok Sharma, Nandini Gokulchandran, Pooja Kulkarni, Sarita Kalburgi, Shruti Kamat, Riddhima Sharma, Samson Nivins, Hemangi Sane, Prerna Badhe. "Improvements in a case of autism spectrum disorder after cell therapy as noted on PET CT brain scan" SJSC. May 2017
4. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Suhasini Pai, Vaishali Ganwir, Prerna Badhe. A case of autism showing clinical improvements after cellular therapy along with PET CT evidence.Journal of Stem Cell Research & Therapeutics. April 2017
5. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni and Suhasini Pai. Stem Cell Therapy in Autism Spectrum Disorders.Recent Advances in Autism. SMGroup. 2017
6. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Avantika Patil, Pooja Kulkarni, Amruta Paranjape PET- CT scan shows decreased severity of Autism after autologous cellular therapy: A case report. Autism Open Access 2016; 6:169.
7. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Avantika Patil, Akshata Shetty, Hema Biju, Pooja Kulkarni, Prerna Badhe. Amelioration of Autism by Autologous Bone Marrow Mononuclear Cells and Neurorehabilitation: A Case Report. American Journal of Medical Case Reports, 2015, Vol. 3, No. 10, 304-309
8. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pradnya Bhovad, Hema Biju, Akshata Shetty, Mrudula Kali and Prerna Badhe. Cell therapy effects portrayed on positron emission tomography computerized tomography scan of the brain serve as a new dimension for autism: A case report (2014), Journal of Paediatric Neurology, 12:3.

9. Sharma A, Gokulchandran N, Shetty A, Kulkarni P, Sane H, Badhe P. Neuropsychiatric Disorder Tackled by Innovative Cell Therapy-A Case Report in Autism. J Stem Cell Res Transplant. 2014;1(1): 4.

10. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Nancy Thomas, Amruta Paranjape, Prerna Badhe. Intrathecal autologous bone marrow mononuclear cell transplantation in a case of adult autism. Autism open access. 2013, 3:2.

11. Alok Sharma, Nandini Gokulchandran, Akshata Shetty, Hemangi Sane, Pooja Kulkarni and Prerna Badhe. Autologous Bone Marrow Mononuclear Cells may be Explored as a Novel. Potential Therapeutic Option for Autism. J Clin Case Rep 2013, 3:7.

12. Alok Sharma, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni, Priti Mishra, Akshata Shetty and Hemangi Sane. An Improved Case of Autism as Revealed by PET CT Scan in Patient Transplanted with Autologous Bone Marrow Derived Mononuclear Cells. J Stem Cell Res Ther 2013, 3:2.

13. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Anjana Nagrajan, Amruta Paranjape, Pooja Kulkarni, Akshata Shetty, Priti Mishra, Mrudula Kali, Hema Biju, Prerna Badhe. Autologous bone marrow mononuclear cell therapy for autism – an open label proof of concept study. Stem cell international. 2013 (2013), Article ID 623875, 13 pages.

14. Alok Sharma, Guneet Chopra, Nandini Gokulchandran, Mamta Lohia, Pooja Kulkarni. Autologous Bone Derived Mononuclear Transplantation in Rett Syndrome. Asian Journal of Paediatric Practice. 2011; 15 (1): 22-24.

15. Dr Alok Sharma , Dr Nandini Gokulchandran , Dr Hemangi Sane , Ms Pooja Kulkarni , Mr Samson Nivins , Ms Maitree Maheshwari , Dr Prerna Badhe.Therapeutic effects of cellular therapy in a case of Adult Autism Spectrum of Disorder.International Biological and Biomedical Journal.(In Press)

B) CEREBRAL PALSY:

16. Alok Sharma, Pooja Kulkarni, Ritu Varghese, Hemangi Sane, Sanket Inamdar, Jasbinder Kaur, Samson Nivins, Nandini Gokulchandran, Prerna Badhe. Clinical translation of the benefits of cell transplantation in a case of cerebral Palsy.International Journal of Biological and Medical Research. Jan 2018.

17. Alok Sharma, Nandini Gokulchandran, Prerna Badhe, Vaibhav Lakhanpal, Pooja Kulkarni, Suhasini Pai, Khushboo Bhagwanani, Amruta Paranjape and Hemangi Sane. Multidisciplinary Approach of Cellular Therapy with Neurorehabilitation in a Case of Mixed Cerebral Palsy. World J. Biol. Med. Science Volume 4 (3) 70-74, 2017

18. Dr. Alok Sharma, Dr. Nandini Gokulchandran, Mrs. Suhasini Pai, Ms. Pooja Kulkarni , Dr. Hemangi Sane , Dr. Khushboo Bhagwanani ,Dr. Prerna Badhe. Diplegic dystonic Cerebral Palsy treated with cellular therapy: a case report. Journal- International Journal of Case Studies. 2017

19. Sharma A, Sane H, Kalburgi S, Kulkarni P, Bhagwanani K, et al. Autologous Bone Marrow Mononuclear Cell Transplantation with Neurorehabilitation for Cerebral Palsy. J Stem Trans Bio 2017; 2(1): 110

20. Alok Sharma, Hemangi Sane, Suhasini Pai, Pooja Kulkarni, Meenakshi Raichur , Sarita Kalburgi, Sanket Inamdar, Nandini Gokulchandran, Prerna Badhe. Intrathecal administration of autologous bone marrow mononuclear cells in a case of Cerebral Palsy coexisting with autistic features". Phys Med Rehabil Int. 2017; 4(1): 1110.

21. Alok Sharma, Tongchao Geng, Hemangi Sane, Pooja Kulkarni. Clinical neurorestorative progresses in cerebral palsy. Journal of Neurorestoratology 2016:4; 1-7

22. Alok Sharma, Hemangi Sane, Pooja Kulkarni, Myola D'sa, Nandini Gokulchandran, Prerna Badhe. Improved Quality of Life in a Case of Cerebral Palsy after bone marrow mononuclear cell transplantation. Cell J. 2015; 17(2): 389-394.

23. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Pooja Kulkarni, Sushant Gandhi, Jyothi Sundaram, Amruta Paranjape, Akshata Shetty, Khushboo Bhagawanani, Hema Biju and Prerna Badhe. A clinical study of autologous bone marrow mononuclear cells for cerebral palsy patients: a new frontier," Stem Cells International, Volume 2015, Article ID 905874, 11 pages.

24. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni and Amruta Paranjape. Stem Cell Therapy for Cerebral Palsy – A Novel Option. Cerebral Palsy. Challenges for the future. 2014: 217-242.

25. Alok Sharma, Hemangi Sane, Amruta Paranjape, Nandini Gokulchandran, Pooja Kulkarni and Anjana Nagrajan, Prerna Badhe. Positron Emission Tomography – Computer Tomography scan used as a monitoring tool following cellular therapy in Cerebral Palsy and Mental Retardation – A Case Report. Case Reports in Neurological Medicine. Volume 2013, Article ID 141983, 6 pages.

26. Dr. Alok Sharma, Ms. Pooja Kulkarni, Dr. Hemangi Sane, Dr. Nandini Gokulchandran, Dr. Prerna Badhe, Dr. Mamta Lohia, Dr. Priti Mishra. Positron Emission Tomography- Computed Tomography scan captures the effects of cellular therapy in a case of cerebral palsy. Journal of clinical case reports. 2012 J Clin Case Rep 2:195.

27. Alok Sharma, Hemani Sane, Pooja Kulkarni,Dhanashree Sawant,Khushboo Bhagwanani,Nandini Gokulchandran,Prerna Bhade,Samson Nivins. 18 FDG PET CT scan maps the effect of intrathecal transplantation of autologous bone marrow mononuclear cells (BMMNCs) in cerebral palsy.Indian journal of Stem Cell Therapy; 2018; Vol 3(1): 71-78.

C) INTELLECTUAL DISABILITY:

28. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Suhasini Pai, Pooja Kulkarni, Vaishali Ganwir, Maitree Maheshwari, Ridhima Sharma, Meenakshi Raichur, Samson Nivins, MS; Prerna Badhe. An open label proof of concept study of intrathecal Autologous Bone Marrow Mononuclear Cells transplantation in Intellectual Disability. Stem cell research and therapy. 2017

29. Sharma A, Gokulchandran N, Sane H, Pai S, Kulkarni P, et al. Cognitive Changes after Cellular Therapy in a Case of Intellectual Disability. J Transplant Stem Cel Biol. 2017;4(1): 4.

30. Sharma A, Sane H, Pooja K, Akshya N, Nandini G, Akshata S. (2015) Cellular Therapy, a Novel Treatment Option for Intellectual Disability: A Case Report. J Clin Case Rep 5:483. doi: 10.4172/2165-7920.1000483.

Other Publications at the End of the Book

SECTION A

A peek into knowing Autism

This handbook will give you quick answers to your concerns like

1. What is Autism?
2. What is sensory integration dysfunction and sensory integration therapy?
3. Which are the different types of sensory dysfunction and their signs?
4. How autism affects behavior and communication?
5. Which sensory integration treatments are used for the different types of dysfunction present in the child?
6. How can experts from various fields help an Autistic child?
7. How to address behavioral issues in the child using ABA?
8. What are the teaching tips for children with autism?
9. How helpful is Art Based Therapy?
10. What can be done to get Effective communication in Autism?
11. How to use the diet to get beneficial effect on Autism?
12. How does physiotherapy contribute to Autism?
13. How does Aquatic therapy help?
14. How does STEM CELL THERAPY offer hope for Autism?
15. And much more...

The book has one simple goal
to enrich the knowledge and help the
hands of caretakers who actually touch Autism

1. About Autism

- Autism spectrum disorder (Autism) is a pervasive developmental disorder that involves abnormal development and function of the brain.
- This complex neurodevelopmental disability typically appears during the first three years of life.
  - Characterized by difficulties in speech, verbal and nonverbal communication, repetitive behaviors and sensory issues.
  - Affects the way an individual relates to his or her environment and their interaction with other people and hence impacts the development in the areas of social interacion, communication skills and behavior.
  - Mental capacities are compromised due to subnormal functioning of some areas of the brain.
- The diagnosis of autism is usually made in early childhood and despite of extensive research, the causes of autism haven't been definitively defined as yet.
- However increased awareness and early diagnosis/intervention and access to appropriate services/supports lead to significantly improved outcomes.
- When autism is detected and treated early, disruptive behaviors can be minimized and cost associated with treatment can be reduced significantly.

What is the fundamental problem resulting in Autism?

"Why did my child develop Autism?" This is a question that parents keep asking themselves all the time. Yet, this is a question to which no definitive answers are given to them. Although the "why" may never be known. What is becoming clearer with ongoing research is, "what is the fundamental problem in the brains of the children with Autism". In autism, though the brain structure looks normal, there are functional abnormalities in specific brain regions like mesial temporal lobe (inner most part of the brain responsible for learning, understanding, memory, social interaction and abstract thinking), frontal lobe (the front part of the brain responsible for emotions and aggression), and cerebellum (responsible for balance, coordination, muscle tone and speech). Hence the dysfunctioning of these areas are responsible for problems seen in autism.

This information, about the functioning of brain areas is obtained from PET-CT and functional MRI scan of the brain. These imaging studies allow us to study the abnormal pattern of cortical activation in autism. These studies indicate that reduced blood flow to certain areas of the brain could lead to reduced functioning of those areas.

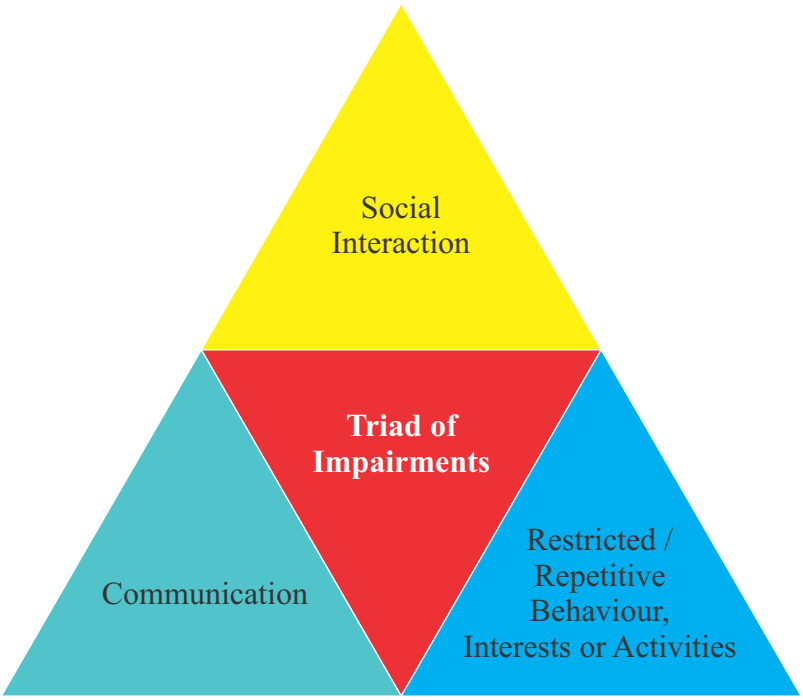


Fig 1 - Problem areas of Autism

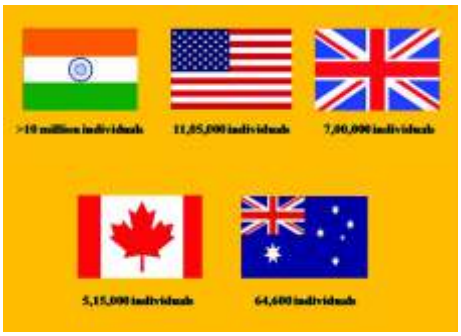


Fig 2 - Worldwide prevalence of Autism

Fig 3 - Few Indian movies highlighting Autism and related disorder

2. All About Sensory Issues

Kids with autism have difficulty in regulating and responding to the sensations from their own body and also from the environment. In order to understand the sensory issues of the child it is important as parents to become more educated about the different senses and the problems associated with it.

Let us know the sensory system first!

- **Three basic senses**

  - **Tactile system**:
    - It includes nerves under the skin's surface that send information to the brain.
    - This information includes light touch, pain, temperature, and pressure.
    - This plays an important role in perceiving the environment and understanding protective reactions for survival.

  - **Vestibular system:**
    - It refers to structures within the inner ear (the semi-circular canals) that detect movement and changes in the position of the head.
    - For example, the vestibular system tells you when your head is upright or tilted (even with your eyes closed).

  - **Proprioceptive system:**
    - It refers to components of muscles, joints, and tendons that provide a person with a subconscious awareness of body position.
    - Proprioceptive system is responsible for providing the body with the necessary signals to allow us to sit properly in a chair and to step off a curb smoothly.
    - It also allows us to manipulate objects using fine motor movements, such as writing with a pencil, using a spoon to drink soup, and buttoning one's shirt.

- **Other Senses:**

  - **Vision**
    - Effective visual processing helps us to identify and interpret the physical features of people, events, and objects, as well as to navigate our environment safely.
    - It also plays a role in the development of pattern recognition, which contributes to our early ability to recognize others. Pattern recognition also makes things memo rable, which helps us to learn and retain information.

  - **Auditory**
    - Hearing provides the basis for developing oral language skills.
    - Being able to hear the sounds allows us to imitate and play with sounds to develop our own language skills.
    - It is the effective development of these oral language skills that provides the foundation for spelling and grammar, which contributes to the later development of written language as well.

  - **Olfaction**
    - The function of the sense of smell is to assist us in discriminating people and things. They also help to alert us to volatile and dangerous substances, such as poisons, leaking gas, or smoke.
    - In addition, our sense of smell has a strong connection to long-term memory.

  - **Taste**
    - The human tongue detects only four or five basic taste components-sweet, sour, salty and bitter.
    - Whereas the human tongue can distinguish only among four or five distinct qualities of taste, the nose can distinguish among hundreds of substances, even in minute quantities. It is the work of the tongue and the nose together that allows us to enjoy and identify different flavors.

Fig 1 - Types of senses

- **Implications**

In general, dysfunction within the sensory systems manifests itself in many ways.

- A child may be over- or under-responsive to sensory input; activity level may be either unusually high or unusually low; a child may be in constant motion or fatigue easily.
- In addition, some children may fluctuate between these extremes. Gross and/or fine motor coordination problems are also common when these three systems are dysfunc tional and may result in speech/language delays and in academic under-achievement.
- Behaviorally, the child may become impulsive, easily distractible, and show a general lack of planning. Some children may also have difficulty adjusting to new situations and may react with frustration, aggres sion, or withdrawal.

- **Now let us know about Sensory Integration!**

- **What is Sensory Integration?**

SENSORY INTEGRATION is an innate neurobiological process and refers to the integration and interpretation of sensory stimulation from the environment by the brain. Sensory integration focuses primarily on three basic senses--tactile, vestibular, and proprioceptive.

A general theory of sensory integration and treatment has been developed by Dr. A. Jean Ayres.

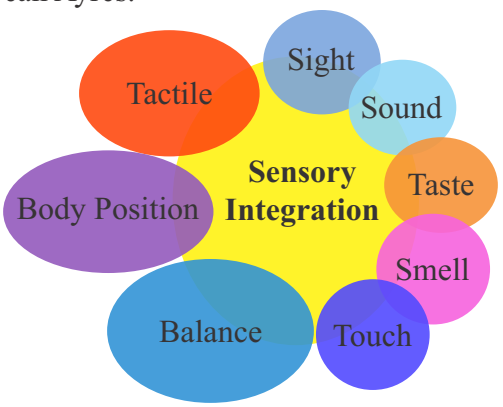


Fig 2 - Sensory Integration

- **So when sensory integration does not take place, sensory integration dysfunction occurs.**

SENSORY INTEGRATION DYSFUNCTION is a disorder in which sensory input is not integrated or organized appropriately in the brain and may produce varying degrees of problems in development, information processing, and behavior. Sensory Integration Dysfunction is to the brain what indigestion is to the digestive tract.

- **Are Autism and Sensory Integration Dysfunction (now called Sensory Processing Disorder) the same?**

Simply put, no – Autism and Sensory Processing Disorder (SPD) are not the same thing. While Autism and SPD are two different and distinct conditions, children on the autism spectrum do have a significantly higher rate of sensory processing delays that shows Sensory Processing Disorder is closely aligned with autism as most autistic children have

significant struggles with SPD. While we don't fully understand the link between autism and SPD, more and more studies suggest that there are genetic components to both disorders and increased incidence of family history for both disorders, as well. It is possible that a genetic piece links processing delays and autism, but at this time there is no medical evidence of that.

- **Clarification for above answer related to treatment**
  Treatment for Autism and SPD sometimes looks the same.
  As part of therapy for a child with autism focuses on improving their sensory processing delays…in which case the treatment would be identical to a child with sensory processing delays.

Now, finally let us know what the different types of Sensory Dysfunction and their signs are.

Types of dysfunction: Tactile, vestibular, proprioceptive auditory, olfactory, oral, visual, auditory language processing and social, emotional, play.

Signs of Tactile Dysfunction	
Becomes fearful, anxious or aggressive with light or unexpected touch	HYPERSENSITIVITY TO TOUCH CALLED AS TACTILE DEFENSIVENESS
Appears fearful of, or avoids standing in close proximity to other people or peers (especially in lines)	
Becomes frightened when touched from behind or by someone/something they cannot see (such as under a blanket)	
Complains about having hair brushed; may be very picky about using a particular brush	
Bothered by rough bed sheets (i.e., if old and "bumpy")	
Avoids group situations for fear of the unexpected touch	
Resists friendly or affectionate touch from anyone besides parents or siblings (and sometimes them too!)	
Dislikes kisses, will "wipe off' place where kissed	
Avoids touching certain textures of material (blankets, rugs, stuffed animals)	
Refuses to wear new or stiff clothes, clothes with rough textures, turtlenecks, jeans, hats, or belts, etc.	
Avoids using hands for play	
Avoids/dislikes/aversive to "messy play", i.e., sand, mud, water, glue, glitter, playdoh, slime, shaving cream/funny foam etc.	
Will be distressed by dirty hands and want to wipe or wash them frequently	
Distressed by seams in socks and may refuse to wear them	
Distressed by clothes rubbing on skin; may want to wear shorts and short sleeves year round, toddlers may prefer to be naked and pull diapers and clothes off constantly	
Or, may want to wear long sleeve shirts and long pants year round to avoid having skin exposed	
Distressed about having hair, toenails, or fingernails cut	
Is a picky eater, only eating certain tastes and textures; mixed textures tend to be avoided as well as hot or cold foods; resists trying new foods	
May refuse to walk barefoot on grass or sand	

Fig 3 - Dislikes kisses

Fig 4 - Distressed by clothes rubbing on skin

Fig 5 - Dislikes dirty hands

Fig 6 - Distressed by Haircut

Signs of Tactile Dysfunction	
A constant need to touch people or textures, even when it's inappropriate to do so	**HYPERSENSITIVITY TO TOUCH UNDER-RESPONSIVE**
Is not aware of being touched/bumped unless done with extreme force or intensity	
Is not bothered by injuries, like cuts and bruises, and shows no distress with shots (may even say they love getting shots!)	
May not be aware that hands or face are dirty or feel his/her nose running	
May be self-abusive; pinching, biting, or banging his own head	
Mouths objects excessively	
Frequently hurts other children or pets while playing	
Repeatedly touches surfaces or objects that are soothing (i.e., blanket)	
Craves vibrating or strong sensory input	
Has a preference and craving for excessively spicy, sweet, sour, or salty foods	

Fig 7 - Mouths Object Excessively

Fig 8 - Self Abusive

Fig 9 - Seeks Messy Play

Signs of Tactile Dysfunction	
Has difficulty with fine motor tasks such as buttoning, zipping, and fastening clothes	**POOR TACTILE PERCEPTION AND DISCRIMINATION**
May not be able to identify which part of their body was touched if they were not looking	
May be a messy dresser; looks disheveled, does not notice pants are twisted, shirt is half un tucked, shoes are untied, one pant leg is up and one is down, etc.	
Has difficulty using scissors, crayons, or silverware	
Continues to mouth objects to explore them even after age two	
Has difficulty figuring out physical characteristics of objects; shape, size, texture, temperature, weight, etc.	

Fig 10 - Difficulty using scissors

Fig 11 - Difficulty in finemotor Task

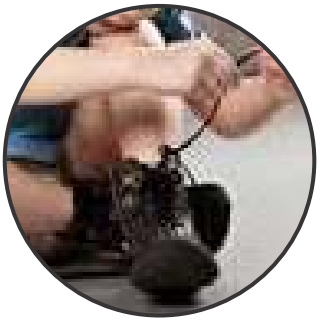


Fig 12 - Difficulty in tying lace

Signs of Vestibular Dysfunction
Avoids/dislikes playground equipment; i.e., swings, ladders, slides, or merry-go-rounds
Prefers sedentary tasks, moves slowly and cautiously, avoids taking risks, and may appear "wimpy"
Avoids/dislikes elevators and escalators; may prefer sitting while they are on them or, actually get motion sickness from them
Afraid of heights, even the height of a curb or step
Fearful of going up or down stairs or walking on uneven surfaces
Afraid of being tipped upside down, sideways or backwards; will strongly resist getting hair washed over the sink fearful reactions to ordinary movement activities
Loses balance easily and may appear clumsy
Fearful of activities which require good balance
Avoids rapid or rotating movements

Fig 13 - Dislikes swing

Fig 14 - Fearful of Jumping

Fig 15 - Loses balance easily

Signs of Vestibular Dysfunction	
In constant motion, can't seem to sit still	HYPERSENSITIVITY TO MOVEMENT UNDER RESPONSE
Craves fast, spinning, and/or intense movement experiences	
Could spin for hours and never appear to be dizzy	
Always jumping on furniture, trampolines, spinning in a swivel chair, or getting into upside down positions	
Loves to swing as high as possible and for long periods of time	
Likes excessive body whirling, jumping, and/or spinning.	
Rocks body, shakes leg, or head while sitting	

Fig 16 - Craves fast swinging

Fig 17 - Excessive Jumping

Fig 18 - Likes spinnings object

Signs of Vestibular Dysfunction	
Has a limp, "floppy" body	POOR MUSCLE TONE AND / OR COORDINATION
Difficulty simultaneously lifting head, arms, and legs off the floor while lying on stomach ("superman" position)	
Often sits in a "W sit" position on the floor to stabilize body	
Fatigues easily!	
Compensates for "looseness" by grasping objects tightly	
Difficulty turning doorknobs, handles, opening and closing items	
Difficulty getting dressed and doing fasteners, zippers, and buttons	
Has poor body awareness; bumps into things, knocks things over, trips, and/or appears clumsy	
Poor gross motor skills; jumping, catching a ball, jumping jacks, climbing a ladder etc.	
Poor fine motor skills; difficulty using "tools", such as pencils, silverware, combs, scissors etc.	
May appear ambidextrous, frequently switching hands for coloring, cutting, writing etc.; does not have an established hand preference/dominance by 4 or 5 years old	
Difficulty learning exercise or dance steps	

Fig 20 - W Sitting

Fig 21 - Difficulty in Dressing

Fig 22 - Difficulty in Climbing Ladder

Signs of Proprioceptive Dysfunction	
Seeks out jumping, bumping, and crashing activities	SENSORY SEEKING BEHAVIORS
Bites or sucks on fingers and/or frequently cracks his/her knuckles	
Loves/seeks out "squishing" activities	
Excessive banging on/with toys and objects	
Frequently falls on floor intentionally	
Would jump on a trampoline for hours on end	
Grinds his/her teeth throughout the day	
Loves pushing/pulling/dragging objects	
Loves jumping off furniture or from high places	
Frequently hits, bumps or pushes other children	
Chews on pens, straws, shirt sleeves etc.	

Fig 23 - Frequent falls on floor intentionally

Fig 24 - Chew's on Straws

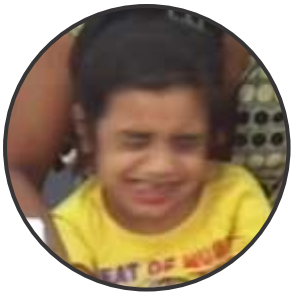


Fig 25 - Grinding Teeth

Signs of Proprioceptive Dysfunction	
Misjudges how much to flex and extend muscles during tasks/activities (i.e., putting arms into sleeves or climbing	DIFFICULTY WITH POSTURAL STABILITY GRADING OF MOVEMENT & MOTOR PLANNING
Difficulty regulating pressure when writing/drawing; may be too light to see or so hard the tip of writing utensil breaks	
Written work is messy and he/she often rips the paper when erasing	
Always seems to be breaking objects and toys	
May not understand the idea of "heavy" or "light"; would not be able to hold two objects and tell you which weighs more	
difficulty manipulating small objects (buttons, snaps), eating in a sloppy manner, and resistance to new motor movement activities	
Seems to do everything with too much force; i.e., walking, slamming doors, pressing things too hard, slamming objects down	
Has poor body awareness; bumps into things, knocks things over, trips, and/or appears clumsy	

Fig 26 - Difficult regulating pressure while writing

Fig 27 - Written work is messy

Fig 28 - Slamming Doors with too much force

Signs of Auditory Dysfunction (no diagnosed hearing problem)	
Distracted by sounds not normally noticed by others; i e , humming of lights or refrigerators, fans, heaters, or clocks ticking	**HYPERSENSITIVITY TO SOUNDS (AUDITORY DEFENSIVENESS)**
Extreme response to or fear of sudden, high-pitched, loud, or metallic noises like flushing toilets, clanking silverware, or other noises that seem unoffensive to others	
Runs away, cries, and/or covers ears with loud or unexpected sounds	
May refuse to go to movie theaters, parades, skating rinks, musical concerts/ park etc.	

Fig 29 - Fearful of high-pitched sound

Signs of Auditory Dysfunction (no diagnosed hearing problem)	
Often does not respond to verbal cues or to name being called	**HYPERSENSITIVITY TO SOUNDS (UNDER - REGISTERS)**
Appears to "make noise for noise's sake"	
Loves excessively loud music or TV	
Seems to have difficulty in understanding or remembering what was said	
Had little or no vocalizing or babbling as an infant	

Fig 30 - Loves Excessive Music

Signs of Oral Input Dysfunction	
Picky eater, often with extreme food preferences; i.e., limited repertoire of foods, picky about brands	**HYPERSENSITIVITY TO ORAL INPUT (ORAL DEFENSIVENESS)**
Resistive to trying new foods or restaurants, and may not eat at other people's houses)	
May only eat "soft" or pureed foods past 24 months of age	
May gag with textured foods	
Has difficulty with sucking, chewing, and swallowing; may choke or have a fear of choking	
May only eat hot or cold foods_	
Dislikes or complains about toothpaste and mouthwash	

Fig 31 -
Gags with textured food

Fig 32 -
Dislike brushing

Signs of Oral Input Dysfunction	
May lick, taste, or chew on inedible objects	**HYPERSENSITIVITY TO ORAL INPUT (UNDER-REGISTERS)**
Prefers foods with intense flavor; i.e., excessively spicy, sweet, sour, or salty	
Excessive drooling past the teething stage	
Frequently chews on hair, shirt, or fingers	
Constantly putting objects in mouth past the toddler years	
Acts as if all foods taste the same	
Loves vibrating toothbrushes and even trips to the dentist	

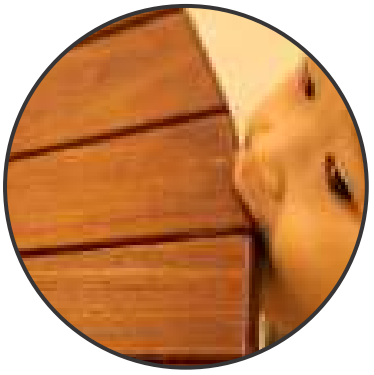


Fig 33 & 34 - Chews inedible objects

Signs of Olfactory Dysfunction (Smells)	
Reacts negatively to, or dislikes smells which do not usually bother, or get noticed, by other people	**HYPERSENSITIVITY TO SMELLS (OVER-RESPONSIVE)**
Refuses to eat certain foods because of their smell	
Offended and/or nauseated by bathroom odors or personal hygiene smells	
Bothered/irritated by smell of perfume or cologne	
Bothered by household or cooking smells	

Fig 35
Dislike smells which do not usually bother

Fig 36
Refuses to eat certain food due to smell

Signs of Olfactory Dysfunction (Smells)	
Has difficulty discriminating unpleasant odors	**HYPERSENSITIVITY TO SMELLS (UNDER-RESPONSIVE)**
Does not notice odors that others usually complain about	
Fails to notice or ignores unpleasant odors	
Uses smell to interact with objects	
Make excessive use of smelling when introduced to objects people or places	

Fig 37 -
Uses smell to interact with objects

Fig 38 -
Make excessive use of smelling when introduced to objects

Signs of Visual Input Dysfunction (No Diagnosed Visual Deficit)	
Sensitive to bright lights; will squint, cover eyes, cry and/or get headaches from the light	**HYPERSENSITIVITY TO VISUAL INPUT (OVER-RESPONSIVENESS)**
Has difficulty keeping eyes focused on task/activity he/she is working on for an appropriate amount of time	
Easily distracted by other visual stimuli in the room; i.e., movement, decorations, toys, windows, doorways etc.	
Has difficulty in bright colorful rooms or a dimly lit room	
Avoids eye contact	

Fig 39 - Easily distracted by other visual stimuli in the room

Fig 40 - Avoids eye contact

Signs of Visual Input Dysfunction (No Diagnosed Visual Deficit)	
has difficulty telling the difference between similar printed letters or figures; i.e., p & q, b & d, + and x, or square and rectangle	**HYPERSENSITIVITY TO VISUAL INPUT (UNDER-RESPONSIVE OR DIFFICULTY WITH TRACKING, DISCRIMINATION, OR PERCEPTION)**
has a hard time seeing the "big picture"; i.e., focuses on the details or patterns within the picture	
has difficulty locating items among other items; i.e., papers on a desk, clothes in a drawer, items on a grocery shelf, or toys in a bin/toy box	
often loses place when copying from a book or the chalkboard	
difficulty controlling eye movement to track and follow moving objects	
has difficulty telling the difference between different colors, shapes, and sizes	
often loses his/her place while reading or doing math problems	
makes reversals in words or letters when copying, or reads words backwards; i.e., "was" for "saw" and "no" for "on" after first grade	
complains about "seeing double"	
difficulty finding differences in pictures, words, symbols, or objects	
difficulty with consistent spacing and size of letters during writing and/or lining up numbers in math problems	
difficulty with jigsaw puzzles, copying shapes, and/or cutting/tracing along a line	
tends to write at a slant (up or down hill) on a page	
confuses left and right	
fatigues easily with schoolwork	
difficulty judging spatial relationships in the environment; i.e., bumps into objects / people or missteps on curbs and stairs	

Fig 41 - Difficulty locating words

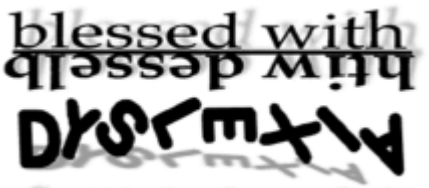


Fig 42 - Difficulty in telling difference between similar printed letters e.g. p & q, b & d

Auditory-Language Processing Dysfunction
Unable to locate the source of a sound
Difficulty identifying people's voices
Difficulty discriminating between sounds/words; i.e., "dare" and "dear"
Difficulty filtering out other sounds while trying to pay attention to one person talking
Difficulty attending to, understanding, and remembering what is said or read; often asks for directions to be repeated and may only be able to understand or follow two sequential directions at a time
Looks at others to/for reassurance before answering
Difficulty putting ideas into words (written or verbal)
Often talks out of turn or "off topic"
If not understood, has difficulty re-phrasing; may get frustrated, angry, and give up
Difficulty reading, especially out loud (may also be dyslexic)
Difficulty articulating and speaking clearly
Ability to speak often improves after intense movement

Fig 43 - Unable to locate the source of a sound

Fig 44 - Difficulty filtering out other sounds

Social, Emotional & Play Dysfunction
Social
Difficulty getting along with peers
Prefers playing by self with objects or toys rather than with people
Does not interact reciprocally with peers or adults; hard to have a "meaningful" two-way conversation
Self-abusive or abusive to others
Others have a hard time interpreting child's cues, needs, or emotions
Does not seek out connections with familiar people
Emotional
Difficulty accepting changes in routine (to the point of tantrums)
Gets easily frustrated
Often impulsive
Functions best in small group or individually
Variable and quickly changing moods; prone to outbursts and tantrums
Avoids eye contact
Play
Difficulty with imitative play (over 10 months)
Wanders aimlessly without purposeful play or exploration (over 15 months)
Needs adult guidance to play, difficulty playing independently (over 18 months)
Participates in repetitive play for hours; i.e., lining up toys cars, blocks, watching one movie over and over etc.

From the above mentioned list, you will get a clear picture of the various kinds of sensory dysfunctions which will guide you to know your child’s areas of deficit.

3. Behavioral Manifestations of Autism

Individuals with Autism demonstrate several behavior issues. Behavior is probably one of the most affected area in Autism. Behavior can be defined as everything a person does, says, thinks, and feels. Having a behavior problem makes it difficult for individuals to function in society, school, work, home, and community settings. Children with Autism may experience mild to severe difficulties in different aspects of behavioral functioning. Below are several different areas of behavior in which children with Autism may experience difficulties. Not all children will have trouble in each of the listed area. The level of difficulty will also differ from child to child. To deal with behavior problems, parents should first make a list of all the behavior problems that the child is facing.

- **Basic or Pivotal behavior issues:** these behaviors are the most basic and important skills that are required to learn or engage in any activity. Children with Autism have extreme difficulties learning these pivotal behaviors.

  - **Absence of eye-contact:** do not make eye-contact with the other people.
  - **Lack of attention and concentration:** difficulties initiating and sustaining attention in any task. E.g., they may look at an activity for a few seconds but they quickly look away or move on to something else.
  - **Limited ability to stay in one place:** unable to sit in a chair to complete a writing task or complete a game or unable to stay steady standing at the sink to complete washing their hands.
  - **Lack of imitation skills:** E.g., watching other children play with a toy and then not attempting to play with the same toy in the same manner.
  - **Inability to respond to his or her name**: do not look at the person who calls out their name. They do not understand that someone is trying to get their attention.

Fig 1 - Inattention

Fig 2 - Difficult Task

- **Behavior issues observed during play:** Play is what children do. Play is how children interact with others. It is through play that children learn many concepts and skills. Children are introduced to social relationships and making friends via playing with other children. But "play" can be a problem area for children with Autism.

  - **Disruptive play:** difficulty playing with toys in a correct manner. They do not play in the way that toys are meant to be played with. E.g., not race a car, not fix puzzle pieces in place, not stack the rings on ring stacker.
  - **Motor Stereotypy:** Instead of playing appropriately, children engage in motor stereotypy. Motor stereotypy means repetitive movements with body parts or objects that are not useful or correct. E.g., hand-flapping, rotating a puzzle piece or wheels of a car in the air repeatedly.
  - **Difficulties in social play (playing with other children):** e.g., trouble playing with other children. They have difficulties playing in the same space as other children. They may engage in pushing children, disrupting the play, or sitting alone in a corner and not participating.
  - **Difficulties in playing structured games**: e.g., difficulty in engaging in games that require turn-taking, sharing toys, following rules, etc.

Fig 3 - Destroying Toys

Fig 4 - Difficulty Playing

- **Behavior issues observed during social communication or social interactions:** Children with Autism have difficulties in speech and communication. They cannot express make social relations mainly because they are unable to communicate with others.

  - **Lack of speech:** e.g., they are unable to emit words and sentences.
  - **No social greetings/small talk:** e.g., lack of social greeting such as "hi/Bye" or small talk "how are you?", etc
  - **No responding to questions:** They appear to ignore what others are saying and appear distracted and non-responsive.

- **No initiation of conversations:** Initiating conversations is another area where children have impairments. E.g., they do not ask questions. Their conversations are restricted to answering questions only.
- **Engaging in inappropriate speech:** e.g., Use of abusive language or saying inappropriate or embarrassing things in public.
- **Repetitive speech or vocal stereotypy**: Repetitive vocal sounds or repeating sentences/ dialogues, scripts outside context while engaging in other activities is vocal stereotypy.

· **Behaviors issues observed during academic work:** These include troubles learning academic materials and studying in a classroom.

- **Difficulties in writing and reading:** Learning to read and write alphabet, numbers, words, doing mathematical calculations, etc. Overall, poor performance in school activities.
- **Difficulties in being a part of a classroom:** These include no participation in class, not raising hand or answering the teachers, not listening to what is being said in the class.
- **Difficulties in memory and remembering**: Children with Autism have impairments in memory. They quickly forget what they have learned and cannot remember information for long duration of time.

Fig 5 - Hitting

Fig 6 - Crying

Fig 7 - Bad classroom behavior

- **Behavior issues observed during self-help skills:** These behaviors include activities of daily living or self-help activities such as bathing, eating, dressing, etc. Children with Autism need additional support and training for engaging in such activities.

  - **Can perform only few steps but not the entire task:** e.g., cannot complete a long task such as hand washing, bathing, wearing clothes, etc. They may be independent in a few steps but not finish the entire task. E.g., they will bath independently but not use soap to clean the whole body.
  - **Needs constant reminders for doing daily activities:** Constant reminders are required for all activities including the activities children have to do everyday like brushing teeth, wearing shoes, etc.

- **Harmful or excessive behaviors:** These are the behaviors that interfere with learning of appropriate behaviors. These behaviors occur mainly because the child does not know how to communicate his wants or likes. These behaviors are compensatory behaviors for appropriate behaviors. These behaviors can also be harmful to the child or others around him. Engaging in such behaviors makes it difficult for the child to be a part of a social group such as school and also engage in various activities such as academic work, play, social interactions.

- **Issues with Motivation:** Children with Autism show very low interest in activities such as play or social communication. They appear to be busy in their own world. They seem detached and disinterested in what is happening around them. Getting them to engage in any activity is extremely difficult because they lack the motivation and necessary skills.

This comprehensive list of target behaviours will help the parents understand what their kids do and decide where their treatment should go.

4. Issues In Communication

Impairements in communication is another important hallmark of Autism and parents always seek professional help with these concerns for their child-"My child does not have speech. Please teach him to talk". In the desperation to see the child verbalize with words and sentences, they not only fail to connect with him/her, but are also unable to consider all the other means of communication which are :

- Whether expression comes through spoken language, or picture cards, a communication device, gestures, or sign language; it is all communication.
- Each child has something to say to us. It is our responsibility to listen in way that ensures that they are heard and understood.

- **Children and young people with autism present following differences within these key areas**

  - Understanding and using gestures, like pointing, waving, or showing objects to others
  - He/she might lose words
  - Following directions
  - Understanding and using words
  - Having conversations
  - Learning to read or write or she may read early but without understanding the meaning

- **Your child also may have**

  - Echolalia-it is the repetition of phrases, words or parts of words
  - Talk with little expression or use a sing-song voice
  - Use tantrums to tell you what he does or does not want
  - Non speech motor functions : posture and gait, gross and fine movement oral movement co-ordination, mouth posture, drooling, swallowing, chewing, oral structures, symmetry, volitional vs. spontaneous movement

- Speech motor function: struggle and strain during speech attempts, visible groping of mouth deviations in prosody (rate, volume, intonation, etc.).
- Fluency of speech , hyper / hypo nasality.
- Alternative and sequential speed on consecutive trials, i.e. "puh-puh-puh" , "puh-tuh-kuh" repetitively.
- Repetitive talk and talking to self they may repeat "Are we going to the zoo? Are we going to the zoo? As many as ten times or until someone interrupts and redirects them. They may also repeat phrases to themselves, such as "its ok, you are not hurt."
- Lack of spontaneous communicative initiations.

Fig 1 -

Fig 2 -

Speech / Oral motorfunction assessment

As the individual with autism does not naturally pick up gestures, facial expressions, appropriate eye contact, or tone of voice they do not easily acquire speech and language or if the language is acquired it is used in unusual ways, with a "marked impairment in the ability to initiate or sustain a conversation with others." .

The therapeutic and social aspect is key, and helping someone with autism acquire speech which will aid in connecting to others.

SECTION B

Build the team for your child care

5. Tackling Sensory Issues

Children with Autism are believed to have difficulties with receiving, assimilating, integrating and processing sensory information. Sensory Integration makes it possible to use our body effectively in the environment, by integrating sensory input. Sensory Integration helps children, to optimise their arousal level, to modulate their sensory inputs, to help for self- regulation and to develop adaptive responses which helps to achieve organised behaviour.

· Sensory Integration Therapy for Tactile Dysfunction

➢ Sensory Integration Therapy for Hypersensitivity to touch

- Give verbal cues to prepare a child, firm pressure can help reduce tone, calm and organize a child's movements.
- Brushing protocol with soft brush. Brushing over arms, legs, back with a soft brush, followed by joint compression helps.
- Go shopping with your child and allow them to choose clothes and shoes that they like.
- Messy play-This is often easier just after the child has been brushed. Play with shaving cream, Funny Foam, artificial snow, Flarp, tubs of kidney beans mixed with little toys for children to dig around for and pour from container to container, make use of Play-Doh, finger paints, and sand.
- Wearing cotton, spandex or lycra clothes under regular clothing has a calming effect because deep pressure is distributed over the body/limbs.
- Separate textures during meals. It may help to avoid mixing food together that have conflicting textures, such as mashed potatoes and gravy.
- Engage in play with undesirable textures for short period of time and in a non threatening way. For example shaving cream, glue, sand, dry rice, etc.
- Try to slowly increase the time that it is tolerated.

Fig 1 - Wilbarger Brush

Fig 2 - Lycra Cloths

Fig 3 - Texture Board

Fig 4 - Coffee Beans

Fig 5 - Shaving cream

Fig 6 - Walking on grass

➢ Sensory Integration Therapy for Hyposensitivity to touch

- Children with tactile under responsiveness have difficulty discriminating between different types of tactile input. They may even have difficulty registering pain and pressure.
- Provide easy access to small hand fidgets (i.e. squishy, soft, textured, soft).
- Allow student to sit in a bean bag chair.
- Use of hand held massager for giving gentle massage.
- Wrapping the child in the blanket/ Sheet.
- Use pressure garments.
- At school make sure that child is not sitting at the end of the desk near the walkway to avoid unexpected light touch.
- Let the child experience deep pressure by giving a hug, massage.
- Use sheets on the bed that can be tucked in tightly to make your child feel secure.
- Integrating tactile sensation in combination with visual, vestibular and proprioception sensation can address issues of poor Tactile Perception and Discrimination.

Fig 7 - Deep Pressure

Sensory Integration Therapy for Vestibular Dysfunction

- **Sensory Integration Therapy for Hypersensitivity to movement**
  - Swinging slowly to and fro, gradually increase the repetition as child develops interest on the swing, gradually encourage child to sit on a low swing and movements like spinning, turning, rolling on the swing.

Fig 8 - Swinging

Fig 9 - Types of low swing

  - Riding on bikes whenever possible.

Fig 10 - Riding Bike

Fig 11 - Riding Bicycle

  - Encourage child to do slow bouncing on Trampoline or jumping on bed or mattress.

Fig 12 - Jumping on trampoline

- Involve child in performing activities like slow rolling and rocking over a therapy ball.

Fig 13 - Slow rolling on therapy ball

- Walking through an obstacle course eg; crawling under the table or chair.

Fig 14 - Obstacle course

- Have the kids place 10 pencils (or any other items) on the floor, and then have them bend to pick up one item at a time and then place it on their desk again.

Fig 15 - Bending down and picking object

- Do the **"head, shoulder, knees and toes" song** - another exercise that gets kid's head going up and down as they carry out the actions of the song, and it is done on the spot.

Fig 16 - 'Head, shoulder, knees and toes'song

- Slow, rhythmical, predictable movement is calming. For example, swinging, rocking, walking, or slow, gentle spinning in one direction.
- Jumping with medicine ball in hand or weighed vest on.

Fig 17 - Weighted vest

- Popping bubbles while swinging! This simple activity can be a great way to get head turns and swings

Fig 18 - Popping bubbles

- Don't forget to try them on their backs while swinging! You can do reaching and ball activities while on their back which is a great reflex integrator!

➢ Sensory Integration therapy for Hyposensitivity to Movement

- Play Games like Freeze Dance with child.

Fig 19 - Freeze dance

- Using the swing in the playground daily.
- Spinning, jumping and running along a target or obstacle course.

Fig 20 - Obstacle course

- Physical activities like swimming and sports to channelise extra energy.

Fig 21 - Swimming

- Using a scooter board (great motor planning and proprioceptive activity as well), spinning on an office chair that spins, and again any of these with eyes closed is best!

Fig 22 - Scooter board

- Activities with eyes closed: use a bandana or play peek a boo with a younger child while swinging.
- Stand on one foot with eyes open and eyes closed.

Fig 23 - One leg standing by child

- Walking on a balance beam with eyes closed.

Fig 24 - Walking on balance beam

- Jump on trampoline with eyes closed, jumping in circles.
- Remember when giving rotary input, 10 rotations to each side, such as 10 spins to the left, stop for 1-2 minutes and give linear input, then 10 rotations to the right.
- Leaning over to pick up ball to throw at a target is very stimulation due to the change in head positions and stop and start of the movement.
- Jumping and falling on a large trampoline safely.
- Walking in a figure of eight '8' pattern while on a large trampoline.
- Crossing midline and position in space awareness while swinging ideas: attach items with links to the ropes all around them, tell them to take off items from the back right rope, and link to the front left rope, etc.
- Prone work: lying on belly to climb rope while on swing, picking up medicine ball and placing in appropriate bucket, throwing at targets while prone, etc.

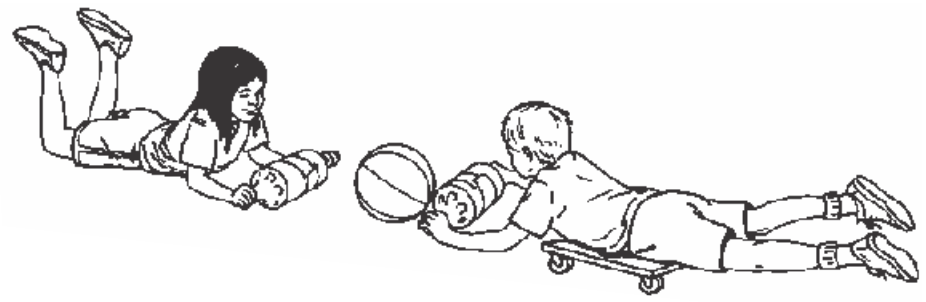


Fig 25 - Activities in prone position.

- Integrating the vestibular sensation in combination with tactile and proprioceptive sensation can address the issues of poor muscle tone and coordination as well.

Sensory Integration Therapy for Proprioceptive dysfunction

Proprioceptive feedback tells us about movement and body position. It's a key to develop body awareness in the child and to develop sense of self. It also helps to integrate all the other sensory input together such as touch and movement.It helps control the arousal level of child.

➢ Sensory Integration Therapy for Sensory seeking behaviour

A 'Sensory Diet' can be given in the following ways:

- Give your child a tight hug.
- Make him/her 'Sandwich' between pillows.
- Encourage to play "Tug of war".
- Ask child to push a grocery trolley.
- Ask him/her to lift bucket full of water or sand or heavy things at home.
- Make him/ her do push ups.
- Give Joint Compression.
- Give Vibration using objects like vibrating toothbrush, head massager.
- Take child for swimming.
- Use spandex vest during the day time and weighted blanket during the night.

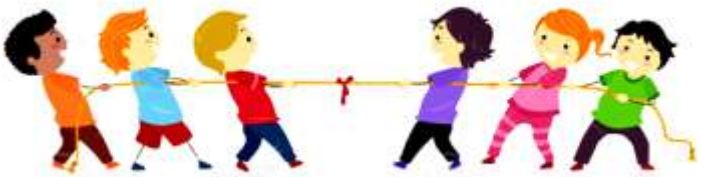


Fig 26 - Tug of War

Fig 27 - Pushing the Trolley

Fig 28 - Vibrating Brush

Fig 29 - Spendex Vest

➢ Sensory Integration Therapy for Postural Instability, Motor Planning and Grading of Movements

- Make him/her crawl, walk, run and jump.
- Target hitting.
- Ask child to do floor push ups, wall push ups and sit ups.
- Make him/ her climb ladder such as a vertical ladder / a rope ladder or simply climb stairs.
- Riding a bike.
- Play jumping games.
- Scooter board activities.
- Ask him/her to rearrange home furniture.
- Attach built up pencil gripper on the pen or pencil used by the child for writing.

Fig 30 - Jumping

Fig 31 - Scooter board activity

Fig 32 - Pencil Gripper

· Sensory Integration Therapy for Children with Auditory Dysfunction

- Noise cancelling headphones and earplugs offer instant comfort and relief.
- Enlist safe places for the child and increase the participation of the child in those places and gradually increase the participation of the child in those places. Eg. Park, Library.
- Reduce the anxiety of the child by allowing him to handle different types of objects making different sounds/ noises.

Fig 33 -
Noise cancellation headphones

- Increased tolerance for noise is observed if 'quiet breaks' are scheduled properly in the daliy routine. Eg After an outdoor session a quiet lunch at home or After a playgroup session let the child relax on the sofa
- Auditory Integration Therapy (AIT) is sometimes suggested to people with noise sensitivity.
- Integrated Listening System trains the ear to do this, so that language can be heard discriminately and learned, while also improving attention and concentration in the midst of noisy environments.
- Cognitive-behavioral therapy for phobias and anxiety because it teaches a person to self-manage emotions and coping skills.
- Many people with tinnitus or hyperacusis are deficient in magnesium or other minerals. Consult with a physician to determine if nutritional supplements may be able to help.
- Certain food additives, especially those in the salicyylate family, are associated with noise sensitivity.

• Treatment for Children with Auditory Hyposensitivity

- Speak slowly and Clearly

Fig 34 -
Speak Slowly and clearly

- Use visual cues and supports to back up verbal communication
- Trying to identify recorded sounds (e.g. sounds of vehicles), things in the environment outside (e.g. birds, crickets etc.), and created noises (tapping on a table, knocking on a door, shaking different objects etc.).

Fig 35 - Sound puzzle games

- Ask the child to identify noises that are close or far away, and high or low.
- Sound pattern games like Tapping on a drum or clapping hands to a rhythmic beat asking them to count the beats or recreate the beat on their own drum or hands.

Fig 35 - Sound pattern games

- Use of Sound Contrast games like Creating sounds that are loud or soft and having them identify which.
- Hiding an alarm clock in the room and ask the child to find the clock.
- Work on the phonics. Ask the child to speak each letter in the word loudly and ask them to repeat it.

· Sensory Integration Therapy for Olfactory Dysfunction

➢ Sensory Integration Therapy for Hypersensitivity to Smell

- Explain to the child about smell they may encounter before so they can be prepared mentally.
- Find a friendly aroma and keep that close to fend off strong fragrances.
- Encourage your child to experience new smells like flowers, food, but don't force him/her.
- Gradually introduce things with particular smell he/she doesn't like when child is enjoying his play along with his favourite music is on.
- Try to slowly introduce new smells in milder amount in child's diet.
- Avoid using products with strong odors whenever possible.
- Use non-scented cleaning products.
- Avoid spicy and aromatic foods.

Fig 36 - Exposure for different smells

Fig 37 - Find a friendly aroma and keep that close to fend off strong fragrances

Fig 38 - Encourage your child to experience new smells

Fig 39 - Slowly introduce different smells

➢ Sensory Integration Therapy for Hyposensitivity to Smell

- Apply strong perfume on child's clothes so they won't smell clothes of other people inappropriately.
- Educate your child about the smells that exist around him or her i.e. when outdoors or in a kitchen cooking with different spices.
- Explain that they have to be more careful with the food or drink they consume, because of their lack of smell sensitivity.
- Give them opportunities to experience different smells such as flowers, strong scented candles, air fresheners, soap and spicy foods.
- Play smelling games i.e. blindfolding and then place a familiar item under their nose to have them guess what it is.

Fig 40 - Educate your child about the smells that exist around us

Fig 41 - Opportunities to experience different smells

Fig 42 - Playing 'Smell guessing games' with the child blindfolded

· # Sensory Integration Therapy for Oral Dysfunction

➢ Sensory Integration Therapy for Hypersensitivity to Oral input

- Apply pressure to the oral (mouth) area (in and around the mouth) before eating and brushing teeth.
- Gum massage at an interval of 3 hours daily.
- Vibratory touch either through an electric tooth brush or vibrating toys on cheeks.

Fig 43 - Vibrating brush

- Use of cold food items (popsicles and frozen grapes) to decrease sensitivity.
- Work from more distal and less personal body areas eg: start light squeezing their hands rhythmically then arms, then shoulders, then cheeks.
- Give activities which are fun and safe.

Fig 44

Fig 45

Vibrating toys

➢ Sensory Integration Therapy for Hyposensitivity to Oral Input

- Blow Bubbles

Fig 46 - Blow Bubbles

- Chew gum/ Hard Candy.

Fig 47 - Chew gum

Fig 48 - Hard Candy

- Drink from water bottle/ Bottle opening that requires sucking.

Fig 49 -
Bottle opening with a straw

- Blow whistles/ Blowing up balloons.

Fig 50 -
Blowing balloons

- Play taste guess.
- Make an edible necklace.

Fig 51 -
Edible necklace

- Pureed Apple through straw.
- Alternative Chewy toys.

Fig 52 - Chewy toys

- Sucking thicker liquids (milk shakes, smoothies, pudding) through a straw (contorted straw).

Fig 53 - Contorted straw

- Dried fruits, marshmallows, oranges, raisins.
- Deep breaths in and out slowly through nose and mouth.
- Maintaining a sound for as long as possible, singing or humming.

➢ Sensory Integration Therapy for Auditory Language Processing Dysfunction

- Play guessing games to locate the source of sound while blind folded.
- Guess 'Who's voice is it ?' while blind folded.
- Gradually exposing the child from a quite environment to slightly normal eg; quite room to parks.
- Identifying name of picture and writing it down.

Fig 54 - Blind folded game

Fig 55 - Identifying Pictures and writing it down

· # Sensory Integration Therapy for Visual Dysfunction

➢ Sensory Integration Therapy for Visual Hypersensitivity

- Consult an ophthalmologist.
- Use of tinted lenses designed to assist in improving the reading vision.
- Avoid cluttering of objects at home, school, or office.
- Sort through toys and objects and store them in opaque containers with labels.
- Clear off work surfaces and provide a child distraction-free workspace.
- Use of flat screen computer monitors and television screens to decrease the perception of flicking light.
- Avoid bright tube lights, Use light dimmer switches to modulate light source.
- Use light diffusing filters.

Fig 56 - Dimmer Switches

Fig 57 - Light Diffusion Filter

- Providing incandescent desk lamps or natural lighting, and reduce fluorescent lighting.
- Avoid complicated prints and patterns on carpets and walls.
- Wear sunglasses and/or a hat outdoors and tinted lenses indoors.

Fig 58 - Sunglasses and Hat

Fig 59 - Incandescent desk lamps

➢ Sensory Integration Therapy for Visual Hyposensitivity

- Use of slant boards to bring work closer to the visual field.

Fig 60 - Slant Boards

Fig 61 - Bright colored pens

- Use of wide ruled paper to help student to form letters at right place.
- Highlighting the margins of the paper.
- Use of modified scissors to cut the paper.
- Use of bright colored pens on the white paper.
- Give oral and written directions while writing / copying.
- Include a simple diagram / handouts below the descriptive part to clarify things.
- Give time to children to ask questions about the presentation and direction.
- Use highlighters / Sticky notes.

Fig 62 - Sticky notes

Fig 63 - Reading Strip

- Draw bold black border around the math problem so that child focuses only on one item at a time.
- Use reading guide strip to block other lines of text while reading.

Fig 64 - Talking Books

Fig 65 - Reading Guide Strip

- Use of talking books in during the lecture.
- Fold the worksheet or use of blank piece of paper to cover-up part of the page.

It is important to deal with the sensory issues of the child in order for him / her to respond effectively to all other treatments such as speech therapy, behaviour therapy, and education.

6. Behavior - Let's Fix What Kids Do

Applied Behavior Analysis (ABA) is simply the application of behavioral principles, to everyday situations, that will, over time, increase or decrease targeted behaviors.

ABA has been used to help individuals acquire many different skills, such as language skills, self-help skills, and play skills; in addition, these principles can help to decrease maladaptive behaviors such as aggression, self-stimulatory behaviors, and self-injurious behavior.

In short, ABA gives simple techniques and strategies that are used to increase good behavior and decrease bad behavior.

- **Basic Principles of ABA: Antecedent-Behavior-Consequence**

  - **Antecedent:** These are events that occur immediately before a behavior. Antecedent is what was happening right before the behavior has occurred. It may be an instruction given by the therapist for the child to perform an action, e.g., "touch your head", "do the puzzle", "match the picture" or any situational event, e.g., "seeing a certain person", "going to the market".

  - **Behavior:** Everything a person does, say, feel or think is a behavior. Any response or action from the child is behavior. E.g., Touching head , Not doing the puzzle, matching the picture, hitting someone, saying "yes", having a tantrum, etc.

  - **Consequence:** Anything that happens after the behavior has occurred. It could be a reaction from the parent or teacher, an object, access to favorite toy, or attention. E.g., getting a break after completing an activity, teacher scolding for misbehaving, parents smiling or disapproving after a child has a tantrum, etc.

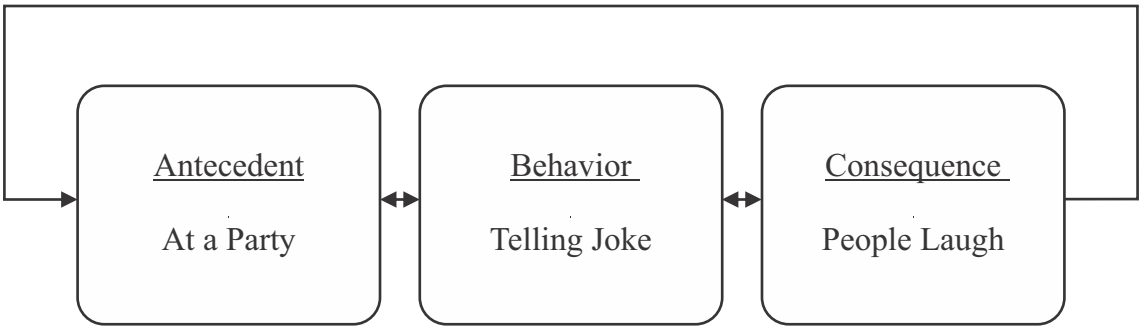


Fig 1 - ABCs of behavior

Antecedent-behavior-consequence forms a behavior chain or simply speaking it makes up what the behavior is all about. Understanding the antecedent-behavior-consequence chain is extremely important for knowing why a behavior occurs, when it occurs and what maintains the behavior over a period of time. Some of the benefits of understanding a behavior chain are:

- To understand and modify behavior, it's important to analyze the antecedents and consequences.
- To modify behavior, we now have to modify the antecedents and consequences that happen before and after a behavior.
- Different combinations of antecedent and consequences changes can be done to change behavior.

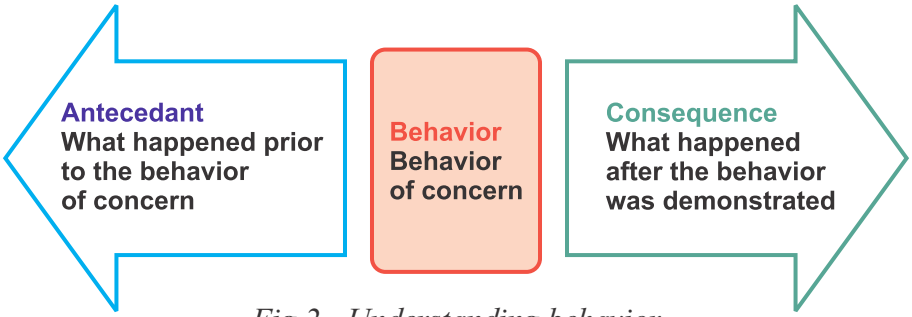


Fig 2 - Understanding behavior

· ##Shaping Behavior

- Shaping a child's behavior involves three steps: tell, show, do.
  - **Tell :** Give an instruction to the child such as " put your toys back" , wait for few seconds for the child to comply, if the child complies at that point provide a huge reinforcement (verbal praise, clap, favorite food), if not then move to the next step - 'Show'.

- **Show:** Repeat the instruction by modeling or gesturing what you want the child to do. E.g., repeat the instruction “put your toys back like this” and simultaneously pick up a few toys and put them away, again wait for a few seconds for the child to comply, if the child complies at this point provide reinforcement but to a lesser degree, if they don't then move to 'Do'.
- **Do:** Physically prompt the child to complete the behavior of putting the toys back. Provide very neutral praise afterwards such as “Okay that's done”.

- Shaping a behavior also involves prompting.
- Prompts are instructions, gestures, demonstrations, physical help provided in order to teach or increase the likelihood of correct responses from the child.

Fig 3 - Shaping behavior

Fig 4 - Group behavior

· # Types of Prompts

- **Gestural Prompt:** It involves pointing, nodding or any other action a child can observe in order to learn. E.g., Pointing towards a cup and asking the child “what is something you drink from”.
- **Physical Prompt:** It involves physically guiding the child to perform an action. E.g., Holding a child's hand to teach the child how to clap.
- **Verbal Prompt**: It involves providing a verbal hint or partially or completing providing the respond to the child which the child then repeats and learns. E.g., after asking the child “what color is your hair?” prompt verbally by saying “bla…”.
- **Visual Prompt:** It is like a modeling prompt where the child learns by observing other or looking at videos, flashcards etc. E.g., teaching a child to shake hands by showing a video.
- **Auditory Prompt:** It involves any kind of sound a child can hear in order to complete a task. E.g., Mother tells the child “put the blocks back in the bag”. Mother will prompt the child by setting up a timer to go off in 5 minutes as a clue for finishing the task.

· # Improving good behavior

As we have seen in section A, children with Autism have several behavioral issues. They do not engage in appropriate or "good" behaviors that are essential for their development. They face difficulties in varied areas of functioning. In this sections, let's talk about some ways or strategies that parents can use to increase or teach "good" behavior that will help our children behave in more effective manner, learn important skills and function well at home, school, and other social settings.

· # Understand various strategies used in ABA to improve behavior:

- **Antecedent Manipulations (things to do before the behavior has occurred)**
  - Task Clarification: break down task into smaller easier steps. Give clear precise instructions.
  - Environment modification: reduce distractions in the environment. Arrange the environment such that the most interesting thing within sight is the activity you want the child to engage in.
  - Routines/ Schedules with breaks: set clear routines with frequent breaks so that the child's day is structured.
  - Rules/expectations: be very firm and clear with what you are asking the child to do. Set age-appropriate expectations.
  - Behavior contracts: written contracts where both individuals sign their acceptance of the terms of the contracts.
  - Capturing motivation: make the activity interesting by engaging in the activity with the individual. Be cheerful and excited when teaching.
  - Provide hints and clues to the child for an activity.

• Consequence Manipulations (things to do after a behavior has occurred)

- **Reinforcement:** Incentive/ reward given to increase the frequency of behavior. It is used to help increase the probability that a specific behavior will occur in the future by giving a reward/stimulus immediately after the behavior is exhibited. Reinforcement can be both **Positive** as well as **Negative.**
  - **Positive Reinforcement** involves presenting a stimulus to the child after the desired behavior is exhibited making that behavior more likely to occur in future. Eg : A mother gives cookie to his son when he keeps his toys back in the cupboard. Here, cookie is a positive reinforcer to reinforce the behavior of keeping the toys back.

- **Negative Reinforcement :** involves when a stimulus is removed after the behavior is exhibited. Eg A child keeps his toys back in the cupboard to avoid solving puzzle which s/he doesn't like.

- **Punishment :** Incentive / Reward taken away to decrease the frequency of behavior. Punishment is a process by which a consequence immediately follows a behavior which decreases the frequency of that behavior to occur in future. Punishment can be both **Positive** as well as **Negative.**

  - **Positive punishment** involves presenting a negative consequence after an undesirable behavior is exhibited making that behavior less likely to occur in future. Eg : A child engages in aggressive behavior with other children is made to finish two pages of worksheet which he doesn't like.

  - **Negative punishment** involves removing a desired stimulus after an undesirable behavior is exhibited. Eg : A child if engages in an aggressive manner, then the teacher take his toy away from him which he likes.

- **Token economy** : Setting up a clear system of rewards so that the child knows what to expect after behaving in a socially desirable manner and exchanging those tokens/ rewards for a bigger reward. Eg-collecting 10 coins in a day in exchange of half and hour of cartoon.

Fig 5 - Prompting

Fig 6 - Model Prompt

Fig 7 - Reinforcement

Fig 8 - Be Involved

Fig 9 - Schedule

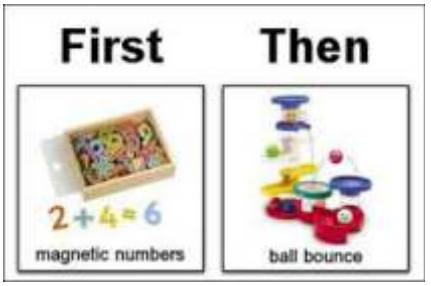


Fig 10 - First Then

- **How to improve basic/pivotal behaviors?**
  - Using 'First and Then' statements with the child. Eg : "**First** we finish our lunch **Then** we will go to park", "**First** we will keep the toys **Then** we will watch cartoon".
  - Rewarding /Reinforcing that behavior.
  - Focusing on what you want the child to do not what you want them to stop doing.

- **How to improve play?**
  - Teaching the child appropriate play behavior.
  - Making play fun for the child.
  - Using a play space with less distraction.

- **How to improve social interaction/communication?**
  - Start group therapy for the child where s/he learns to be around people.
  - Teaching the child turn taking.
  - Using picture cards to teach the child better communication.
  - Conduct role playing and Observational learning for the child where s/he should be taught how to behave appropriately in a social situation.

- **How to improve academic skills?**
  - Provide a structured learning environment to the help the child focus better.
  - Providing a step by step instructions to the child.
  - Incorporate child's area of interest into the lesson.

- **How to improve self-help skills?**
  - Using simple steps initially to teach the child.
  - Using visual communication to help the child understand.
  - Giving practice to the child for every skill.
  - Rewarding the child for every skill achieved.

Fig 11 - Physical Prompt

Fig 12 - Fun Activity

Fig 13 - Help the Child

Fig 14 - Playing together

Fig 15 - Independent Play

Fig 16 - Make it Fun!

Fig 17 - Learning Alphabet

Fig 18 - School Work

Fig 19 - Sitting in Class

Fig 20 - Fun worksheet

Fig 21 - Communication Aid

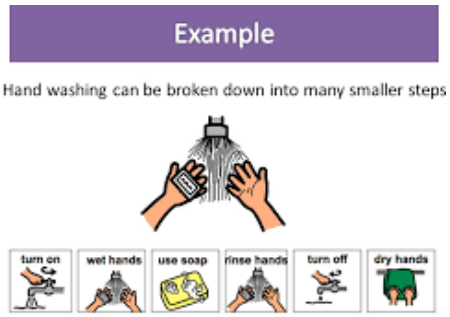


Fig 22 - Break down Task

Fig 23 - Group Work

Fig 24 - Teach Imitation

Fig 25 - Aggression

Reducing Inappropriate Behaviors

We saw that children with Autism have trouble engaging in "good" behavior. Behaviors or appropriate skills those are necessary for the mental, academic, and social development of a child. If not engage in "good" behavior what do they do then? They simply engage in "bad" behavior.

• Types of "bad" or inappropriate behaviors:

- **Motor stereotypy:** hand flapping, rotating around themselves, jumping, running around, twisting and turning objects, repetitive movements with objects or their own body parts.
- **Vocal stereotypy:** emitting sounds, words, scripts, songs over and over again. This is not useful and out of context.
- **Aggression:** hitting others, slapping others, pushing others, throwing things at others.
- **Property destruction:** throwing things, breaking things.
- **Self-injurious behavior:** harming oneself by hitting oneself with hands or hitting one's body parts on external on objects such as walls, tables, etc.
- **Pica:** putting non-edible things in mouth. E.g., mud, chalk, toy pieces.

It is absolutely important for a parent to understand this "bad" behavior. Just labelling it as "bad" behavior does not help in reducing this behavior. Children with Autism often engage in excess behaviors that serve no function. These behaviors can be classified into two categories:

- **Harmful behavior:** behavior that will hurt the child or others around him. Such behaviors are dangerous and as parents, these behaviors are of biggest concerns. E.g., aggression, pica, self-injurious behaviors, etc.
- **Interfering behaviors:** behaviors that are not harmful but they interfere with all other functioning of a child. These behaviors take away attention and time from learning "good" behaviors. They impede learning and progress of a child. E.g., motor or vocal stereotypy, throwing objects, etc.

Things to remember when attempting to fix "bad" behavior:

- First, list out all the "bad" behaviors.
- Divide these behaviors into the two above mentioned categories. This is important because our method to fix the behavior will depend on the category it falls under.
  - For harmful behaviors, we want to completely eliminate these behaviors.
  - For interfering behaviors, we want to reduce them or teach the child to put these behaviors on HOLD when engaging in appropriate behaviors.
- Not all behaviors can be modified. So decide which behaviors are more harmful or interfering than others and try to deal with those first.

Fig 26
Visual Stimming

Fig 27
Self Injurious Behavior

Fig 28
Hitting other kids

- Children engage in these behaviors for a reason. The reasons and signs that are useful to recognize if that reason applies to your child could be:

Reason	Signs to recognize if this reason applies to your child
Inability to behavior in an appropriate manner	Child is unable to show that he or she has the necessary skills when we know that they are motivated but are still not engaging in appropriate behavior
The behavior itself gives them pleasure	They engage in this behavior when they are with others and also when they are alone, they seem completely lost in engaging in this behavior and do not seem to be aware of what is happening around them
More fun than appropriate behavior	The child laughs or smiles when he is engaging in this behavior
Way to get attention from parents	The child looks at the parents or waits for them to say something or scold after engaging in this behavior. They engage in this behavior only when a certain person or parent is around but not at school.
Get access to something	The child stops engaging in the behavior when he or she gets a favorite toy or food item.
To get away from the task or demands	The child starts engaging in the behavior immediately when he or she sees that parents are going to ask them an activity or task. They stop when they are allowed to escape from the task.

- Understanding the category under which the "bad" behavior falls and the reason behind it will help parent design an effective solution for the behavior.

What should parents do to reduce/eliminate inappropriate behavior:

- Teach good behavior.
- Reinforce or reward good behavior.
- Do not provide any rewards or attention for bad behavior. This included smiling, scolding, facial expressions, actual objects, breaks or escape.
- Children want to communicate and are not able to. Hence, teach them ways of communicating. If they cannot speak, use pictures or signs to teach them to communicate their wants.

- Find out the reason for bad behavior, and teach appropriate ways of satisfying that need. E.g., if a child engages in throwing objects because he wants to escape from an activity, teach him to finish the activity quickly and get a break. Just giving him a break or letting him escape from doing the activity will only help him learn that whenever he want to escape from an activity he has to throw objects and he gets a break.

- Do not provide the object that the child wants immediately when he/she starts engaging in bad behavior. E.g., if a child starts crying or throwing tantrums because the child wants to watch his/her favourite videos, do not give the video. Let him/her calm down a little and then teach the child to ask for the video appropriately and then provide the video.

- If a child engages in an activity because it gives him pleasure, we cannot completely eliminate this behavior. What we can do instead is teach him/her to put the behavior on hold and engage in appropriate behavior and then he/she is allowed to engage in his/her pleasurable behavior. Also, we can teach that if the child has to earn "free time" to engage in the pleasurable behavior, he/she has to complete a non-preferred activity.

Motivation

Motivation is the interest or desire to engage in some activity. We need to be motivated to play, work, study, and complete our daily activities. Motivation is necessary for our routine functioning as well as to learn anything. Children with Autism are not motivated to engage in any appropriate behavior. Instead they have several behavior issues that take away their motivation from most activities that are helpful for functioning.

- **Due to lack of motivation to engage in good behavior, children with Autism appear to be:**

  - Engaging in stereotypy: Children with Autism engage in high levels of motor and vocal stereotypy which inhibits them from engaging in appropriate behavior.
  - They appear lost in their own world. Their attention seem to be absent from the activities they are supposed to be doing.
  - They engage in disruptive or harmful behaviors which interfere with learning.
  - Reduced sitting tolerance: children move from one activity or another very quickly. They do not engage in the activity for longer duration of time.
  - Inability to complete anactivity.

- **The possible reasons could be:**

  - Disinterest in good behavior as it does not give them any rewards.
  - Inability/ not knowing how to engage in good behavior.
  - Other bad behaviors seem more pleasurable.
  - Engaging in bad behavior gets them what they want.

As parents, it is crucial to understand that the child will have difficulties learning tasks that he or she is not motivated to learn. The easiest fix is to find activities that interest the child. Use these activities to teach. For the activities that are not interesting, find ways to make that activity interesting. There are several ways to make an activity interesting so that the child is motivated to engage in that activity.

· Ways to increase motivation:

- Try to teach when the child is in a good mood.
- Start with activities that he likes. Once he is attending, try to teach the more difficult activities.
- Be involved with the child through-out that activity. Interact with the child constantly while he is engaged in that task.
- Combine that activity with some other activity that is fun for the child.
- Add external rewards that the child gets if he completes a non-preferred activity. Let the child pick what he or she wants to earn for engaging in non-preferred activities.
- Make the child engage in the non-preferred activity after which he or she gets access to a preferred activity. E.g., use “If-Then cards.”

Correcting the behavior problems will enable the child to function appropriately in the home, school, and community.

7. Empowering to Communication

Now, lets discuss how you could work on your child's communication. The specialist to assist your child in this regard is a speech and language pathologist. The speech language pathologist's role is planning and executing a program for autistic children that emphasize the development of communication and interaction skills. The role of a speech therapist is not just limited to development of language skills but they employ a holistic approach for developing communication skills (both verbal-nonverbal), cognition and social skills. "Remember, the aim is effective communication and not speaking."

- **A Speech and Language Pathologist (SLP) works with children with autism to address the following:**

  - Helping the child to understand communication.
  - Facilitating understanding of spoken language and situation expectations.
  - Giving the child something to talk about.
  - Giving the child a means of communication.
  - Giving the child a reason to communicate.
  - Identify the 'ideas' that motivate your child.
  - Observe your child and write a list of all the objects, characters, actions and attributes that motivate 'them' in play. e.g., Objects – mirrors, water, umbrellas, balls, mango, trucks etc. Characters - Minnie Mouse, Wiggles, Tinker Bell, Toy Story etc. Actions – collecting, pouring, running, blowing, connecting etc. Attributes – fast, wet, dirty etc.

- **When is the best time to start speech therapy for autism?**

The short answer to this question is…..the earlier, the better.
Autism is usually evident before age 3, and language delays can be recognized as early as 18 months of age.

In some cases, autism can be identified as early 10 to 12 months of age…but of course, as a parent, you may not be looking out for it when your child is that young. It is very important to start speech therapy as early as possible, when it can have the greatest impact. Intensive, individualized treatment can help lessen the difficulties that may result from this social communication disability.

· Does speech therapy for children with autism work?

Studies show that, with early identification and intervention, two out of three children with autism improve their communication skills and their grasp of spoken language when they receive speech therapy.

· How does speech therapy help children who have autism?

The whole purpose of speech therapy is to help a child to improve their communication for children with autism, this is especially important because communication is a key component in their ability to form relationships and function in their world. Often, speech therapy can help a child with autism to:

- **Develop the ability to express their wants and needs**
  - This might be by using both verbal and non-verbal communication. Kids with autism need to be taught how to exchange ideas with others. This is not only important within the family, but also when they move outside of the home and want to build relationships with their peers.
  - Real objects: The child uses various real objects to communicate (e.g., gives his parent shoes to indicate that he wants to go outside).
  - Miniature real objects: The child understands that a miniature object represents the full-sized object (e.g., a miniature cup is representative of a real cup).
  - True Object Based Icons (T.O.B.I.s): A T.O.B.I. can be a line drawing, scanned photograph, etc., which is cut out in the actual shape or outline of the item it represents. Symbol shape, which the child can both *see* and *feel*, appears to assist the child in more readily understanding a 2-dimensional representation system.

- **Understand what is being said to them**
  - Speech therapy helps children with autism to comprehend the verbal and nonverbal communication
    that other people use. It helps them to recognize cues like body language and facial expressions.
  - Speech therapy can also help a child with autism to understand how to initiate communication without prompting from others.
  - Gestural: Pointing, showing, gaze shift (e.g., a child looks or points to a desired object and then shifts his gaze to another person, thereby requesting that object. [i.e. the communicative act of requesting).

- **Communicate in order to develop friendship and interact with peers.**

  - Some children with autism struggle with the spontaneity and unpredictability of casual conversations. Some children also have very specific interests and find it hard to talk about other things. Speech therapy can teach these children strategies for mixing with other kids so that they can make friends, play and experience social success.
  - Requesting social routines (e.g., *requesting* to play "peek-a-boo" and "patty-cake" games); Requesting comfort (e.g., *requesting* to be held when distressed); Greetings (e.g., "Hi" /"Bye") Calling attention: (e.g., child calls attention to self through calling others); Showing off (e.g., child exhibits "show off" behaviors during games, such as peek-a-boo, dress up, etc.).

- **Learn to communicate in a way other people understand**

  - Autism sometimes brings with it idiosyncratic learning patterns and unusual language processing. As a result, children who have autism commonly have problems developing spoken language.
  - Sometimes, they learn spoken language in "chunks" of favorite stories or TV shows without really understanding what they are saying or being able to use any of the words in the "chunk" independently. This is called "Echolalia" and speech therapy helps children to find ways to overcome it and the other difficulties that children with autism have when talking with others.

- **Articulate words and sentences well**
  Like many neuro-typical children, kids with autism also struggle with the articulation of sounds and putting words into sentences. Many children with autism also have great difficulty with time concepts, abstract language and vocabulary that depends on context for meaning. Non-literal language like idioms, hints, and indirect instructions can also be tricky. These are areas that a speech pathologist can help a child with autism.

· **Training Strategies :**

- Keep in mind the basics before getting into in depth training.
- Be emotionally available to your child let him know-"I am here for you."
- Do not forget to establish contact with your child before speaking or communicating: Physically move to the child's level. Squat down, kneel and position yourself so that you are face-to-face.
- Establish attention with contact, visual props; ensure that the child is oriented towards you.
- Use gestures meaningfully.
- Use gestures to accentuate the clarity of your communication, not to confuse the child or distract him.
- Do not use complex sentence forms and expressive forms of language. Stick to literal and concrete sentences.

The intervention strategies are planned based on whether the child is verbal or non-verbal. In case of non-verbal children with Autism, the SLP needs to work on enhancing sitting compliance, eye contact, joint attention, language comprehension and expression, utilizing the best receptive and expressive modalities for the same.

- **Picture Exchange Communication System (PECS)**

  - Picture Exchange Communication System (PECS) is amongst the most commonly used techniques with children and adults who have little or no verbal ability. Therapists, teachers and parents help the child or adult build a vocabulary and consistently articulate desires, observations and feelings through pictures.

  - This is very structured method of using pictures to enhance communication. Children with nonverbal autism need some mode of communication. Often children with autism express their needs by pointing out towards the desired objects or dragging their parents to the area of interest. In situations when these strategies do not work or are not feasible, what alternative do they have? They may start screaming, getting, restless, and get frustrated. It's not always possible for parents to understand what their child wants. Here, if the child has an option to select his desired item from a set of pictures, then it would be easy for you to understand your child's need and automatically your child's frustration will reduced.

  - The role of speech therapist is not just limited to development of language skills they employ a holistic approach for developing communication skills (both verbal-nonverbal), cognition and social skills. "Remember, the aim is effective communication and not speaking."

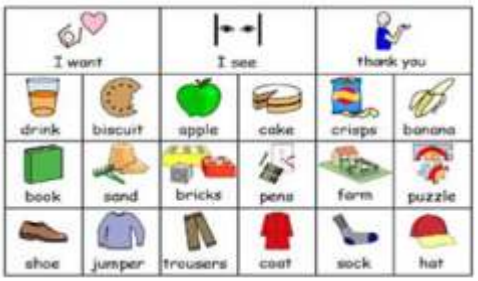


Fig 1, 2 & 3 Communication aids

- **Augmentative and alternative communication (AAC)**

Augmentative and alternative communication (AAC) is an umbrella term that encompasses the communication methods used to supplement or replace speech or writing for those with impairments in the production or comprehension of spoken or written language.

- **AAC includes strategies that improves communication for those who are**
  - Non-speaking.
  - Natural speech does not meet their needs for functional communication.

Fig 4 & 5 - Picture communication

- **Augmentative Communication**
  - When natural speech is not meeting their communication needs, these strategies augment their current communication.

- **Alternative Communication**
  - For those who are non-speaking, strategies are an alternative to natural speech.

- **More About AAC**

Augmentative and alternative communication (AAC) includes all forms of communication (other than oral speech) that is used to express thoughts, needs, wants, and ideas. We all use AAC when we make facial expressions or gestures, use symbols or picture, or write. People with severe speech or language problems rely on AAC to supplement existing speech or replace speech that is not functional, special augmentative aids, such as picture and symbol communication boards and electronic device, are available to help people express themselves. This may increase social interaction, school performance, and feelings of self-worth.

- **What are the types of AAC systems?**

When children or adults cannot use speech to communicate effectively in all situations, there are options.

- **Unaided communication systems** – rely on the user's body to convey messages. Examples include gestures, body language, and/or sign language.
- **Aided communication systems –** require the use of tools or equipment in addition to the user's body. Aided communication methods can range from paper and pencil to communication books or boards to devices that produce voice output (speech generating devices or SGD's) and/or written output. Electronic communication aids allow the user to use picture symbols, letters, and/or words and phrases to create messages. Some devices can be programmed to produce different spoken languages.

- **Who benefits from AAC?**
  - AAC users utilize AAC to compensate for a lack of functional speech (a motor skill).
  - Needing or using AAC strategies should not limit access to language (a cognitive skill)

- **What is our goal for AAC users?**

  We want the AAC user to be able to produce SNUG
  - Spontaneous
  - Novel
  - Utterance
  - Generation

- **AAC users produces words / phrases / sentences**
  - That are spontaneous.
  - That are novel, not scripted or predetermined by their communication partner.

- **What kinds of AAC strategies are out there?**
  - Devices and Communication Systems.
  - Paper based systems topic boards / communication boards.
  - Communication books.
  - Eye gaze boards.
  - Alphabet boards.



Fig 6, 7 & 8 - Examples of AAC

- **How can I make AAC strategies successful in the home, school, and community?**

  - Use aided language stimulation (also called aided language input). Create a verbal atmosphere even before verbal language is expected.
  - They are immersed in the language, or symbolic code, that they are expected to use.
  - AAC users learn language the same way.
  - AAC users given the same experience / opportunity.

The speech language pathology is best suited to accept this challenge to try to blend into their unique world; understand their unique styles of communication and facilitate communicative strategies which will enable them to communicate as optimally as feasible with a group other than the immediate family.

8. Paving The Way For The Education

Often met with an ambiguous definition, the umbrella term of Special Education broadly identifies the academic, physical, cognitive and social-emotional instruction An Individualized Education Program (commonly referred to as IEP) is a document, mandated by the Individuals with Disabilities education act of 2004 (IDEA), which clearly defines the individual goal and objectives set for a child with a disability. These programs are written documentation of the special educational program and academic modifications required to meet the child's individual needs. The two main purposes of a student's IEP are to:

- Set reasonable learning goals for the student,
- State the required services that the school district needs to provide for said child.

IEPs are developed by a team including the child's teacher (s), parents, and supporting school staff. This team meets annually (at minimum) to assess the academic and developmental progress of the student, design appropriate educational plans, and adhere any changes if necessary. The main goal these reviews are to ensure that the child is receiving appropriate and adequate services within their least restrictive environment.
While each child's IEP is unique, IDEA mandates that all IEPs must contain the following specific information:

- Student's present level of academic achievement and overall performance.
- Annual goals / objectives for the child (milestones that both parents and school staff feels is reasonably achievable within the next year.)
- Special education and related services, including supplementary services such as adaptive communication devices, adequate transportation services, and appropriate school personnel.
- Portion of the day that the child will be educated apart from his or her typically-developing peers.
- Participation and/or modification to district-, state-, and nation-wide assessments.
- How child's progress will be measured.

- **Academic issues noticed in children with Autism**
  - Avoid eye contact and want to be alone in classroom set up
  - Have trouble understanding other people's feelings or talking about their own feelings.
  - Have delayed speech and language skills.
  - Repeat words or phrases over and over (echolalia).
  - Give unrelated answers to questions.
  - Get upset by minor changes.
  - Have obsessive interests.
  - They have rote learning.
  - Autistic kids having difficulties in generalization all concepts.

- A functional curriculum is one focused on practical life skills and usually taught in community-based settings or natural environments with concrete materials that are a regular part of everyday life.

Fig 1 - Teaching Number Concept with coloring

Fig 2 - Number Concept ith play method

· How does special education help Autistic children

- Ensuring appropriate educational opportunities for students with disabilities is one of the greatest challenges that public schools face. Research suggests that few school leaders are prepared to provide effective special education leadership.
- Special educator make child centered curriculum which help children improve their cognitive skills
- Visual learning aids: Many students with autism learn better with visual aids due to difficulties understanding verbal instruction. Visual supports should accompany lessons to help illustrate ideas. In fact, picture cards, such as the Picture Exchange Communication System, can help nonverbal children with autism learn how to communicate.
- Structured learning environment: A structured learning environment, similar to the TEACCH method, can help students with autism better focus and understand lessons. Structured learning environments have minimal distraction with clearly defined boundaries, and provide concise step-by-step instructions for tasks with specific goals.
- Sign language: Sign language is an effective method for teaching nonverbal children with autism because they respond well to hand motions.
- Peer tutoring and inclusion: Many schools practice inclusion, which educates autistic students in the same classroom as non-autistic students.

The idea is that the student with autism learns faster and adapts appropriate social behavior by observing her peers. Peer tutoring is one-to-one teaching method often practiced in inclusion schools. In a structured environment, a non autism student leads an autistic student through a number of tasks with concise instructions.

In conclusion, special education gives modification in normal schooling set up. A special educator gives guidelines to parents for implementations of concepts in day to day life .

9. Learning Through Art

In recent years, caregivers are seeking alternative or complimentary treatments for autism and have a wide array of options available. One such treatment is art based therapy.It is a natural fit for autism. It helps assuagethe deficits associated with autism by channeling autistic behaviors into an expressive, creative outlet. It promotes communication, self-exploration, emotional growth, and sensory integration while also encouraging social interaction in a fun setting.

Art Based Therapy: What is it?

- It is a form of psychotherapy utilizing creative modalities, including visual art-making, drama, music, games & exercises,and dance/movement, within a therapeutic relationship to improve physical, mental, and emotional well-being.
- Art therapy differs from traditional art-making or performance in that the emphasis is on the process of creating and making rather than on the end product.
- Art therapy can be practiced with individuals as well as groups.

Why use Art based Therapy with Autism:

- Art based therapy is an excellent treatment for autism because it is inherently reinforcing for the children. It is a great source of enjoyment while at the same time mitigates the symptoms of the child.
- People with autism are often highly visual thinkers. Many report that they "think in pictures" i.e., they express their feelings and ideas through images. This is very natural for such people and can be welcome relief from the daily struggle of using words effectively
- Art based therapy is can also a wonderful facilitator in forming connections with peer, turn taking, respecting differences, and other social skill can in an enjoyable manner.

How does Art Based Therapy help Autistic Children: Art based therapy can help children to develop interpersonal skills, manage behavior, reduce stress, increase self-esteem, and achieve insight. Art based therapy can encourage autistic kids to:

- Express feelings that may be difficult to verbalize and thereby increase communication skills
- Explore their imagination and creativity and help them think symbolically

- Develop the ability to recognize and respond to facial expressions and interpreting tone of voice.
- Manage sensory issues and develop healthy coping skills and focus.
- Improve self-esteem and confidence and identify and tackle emotional issues and concerns.
- Share in a safe nurturing environment.
- Improve fine and gross motor skills and physical co-ordination.
- Identify blocks to emotional expression and personal growth.
- Increase tolerance for unpleasant stimuli while channeling self-stimulating behavior into more creative activity.
- Develop cooperation, turn-taking, respecting differences, teamwork and a sense of acceptance and other social skills that can all be practiced in an enjoyable, natural setting.
- Channel non-functional or inappropriate stimming into socially acceptable, creative outlet.

Different art forms and their corresponding therapeutic aspects

· #Visual-Arts including use of colors and different types of paintings

- Improve learning capacity.
- Reduces sensory problems.
- Decreases self-stimulation.
- Activates the visual /perceptive area of the brain.
- Improves sitting tolerance and social skills.
- It is a good form of oral-motor exercises.
- It helps kids with autism to express themselves and explore their emotions in a safe and nurturing environment.
- It addresses deficits related to autism and problematic behaviorsand promotes healthy self-expression.

· Dance/ Movement and Games

- Various types of movement helps in reduction of hyperactivity in the children and improves their body awareness
- It enhances their self-confidence
- Improves social skills
- It encourages them to participate in games thereby improving their game concept, turn taking while fostering social interaction with others in the group.
- It a mode of learning infused with fun

· Drumming and Music

- Drumming improveshand-eye co-ordination
- Its enhance the creativity of the child
- It increases the sitting tolerance of the child and further reduces the hyperactivity
- Its improves the fine motor skills

Fig 1 & 2 -
Different forms of painting

Fig 3 - Movements

Fig 4 - Drumming Activity

Art based therapy is a fun-filled way of teaching complex skills to children.

10. Music For The Child's Soul

Music is used in recounting stories, celebrating life events etc**.**, It helps them to identify life challenges and helps in venting out feelings and emotions that cant be spoken .

- **How it helps children with autism**
  - Music Therapy works like magic in case of autism children if taught with patience .
  - In first 5 sessions the concept of music is introduced followed by 6 to 10 sessions for building a good rapport between the parent and the teacher.
  - In the next 11 to 15 sessions the medium of the musical instruments is used to help the patient engage in sound / voice, along with the use of fine motor skills (use of fingers , eye-hand coordination) to play the instruments.
  - By this time therapist is able to understand what songs the child is tuned to whether it s a song at school or a desired film song.
  - Multi stage treatment involves connecting words, speech, rhythm to memory by incorporating them into song. Variations like time of practice for the benefit of the student can be introduced.
  - Music helps in reducing social isolation, and increases interest in external events (exposure).

- **Improvements that take place in the child**

  - MT improves mood and social interaction. Here therapist needs to make an attempt and address parent to get patient involved in play instrument at social functions. This will build confidence and boost self esteem and make him feel an integral part of society.
  - It helps in working the upper body parts like hand, shoulder, wrist, forearms and thus helps in coordination and relaxing the child.

- Effects will be seen in their social behavior, leading to improvement in conversation and other skills like memory.
- It helps in bringing down the hyperactivity of the child.
- Children are better able to express their emotional states while listening to different kinds of music.
- Helps overcome verbal barriers to express emotion.

· How do we teach children with autism

- Irrespective of raag alaap / sargam / western classical, just simple notes in form of alphabetical order are written. For eg:- A tune like twinkle twinkle little star will be CCGGAA .
- The student is made to read the notes that are written for a particular song.
- At first, just the index finger is introduced. The other finger numbers are written on the instrument and the child is asked to start playing with support from the therapist.
- While teaching drums, use a drumstick that can be coloured to let the student explore and build curiosity. The child's skills are observe and the song is introduced with repetitions. Normally only 4 lines of a song or rhyme are introduce at first and then followed by 10 to 16 lines.
- The bongo is introduced to those who would like to avoid string instruments that may cut or bruise the child.
- The bongo also has less noise and not much banging on the instrument is needed. This also helps the therapist effort to bring in discipline and instructions during the class / sessions.

The purpose of music therapy the is to improve the child's rhythm, coordination, sequencing, spatial organizing, and most important timing and melody along with building their self esteem.

11. Group Therapy

Group Therapy is a unique form of therapy in which group of children participate in the activities together. Group therapy should comprised of around 4-8 children, approximately same age with similar social, emotional and behavioral goals.

- **Group Therapy** is **beneficial** for children with autism to develop:

  - Basic interaction skills & social skills.
  - Conversational skills.
  - It also helps to reduce hyperactivity and impulsivity.
  - It improves child's feeling of self esteem and to develop self confidence.
  - Techniques to assist them to self regulate their emotions.
  - Appropriate emotional and social responses.
  - Improving imitation skills.
  - Help to learn turn taking in play.
  - Problem solving skills.
  - Organizational skills.

Through Group Therapy children and their families get to know that there are other children who are facing similar challenges just like them.

Fig 1 - Improving interaction skills in a Group setting

Fig 2 - Improving imitation skills

· How Group therapy should be administered

- The child with poor social skills should gradually be introduced into a small group.
- It should be a fun experience for the child.
- Start with simple activities
- Keep things organised.
- Provide help whenever the child needs it.
- Have slow rhythmic music in the background.
- If your child becomes irritable/ hyper during group therapy, take him/ her to a quite place for some time and bring back to the group when he/she has calmed down.
- It may take some time to see long term changes in child's behaviour so Be Patient.

Fig 3 - Turn Taking in Group Therapy

Fig 4 - Fun games teaching school behavior

In conclusion, group therapy fosters social communication and interaction. It provides children an opportunity to make social relations in a fun environment.

12. Child's Water World - Aquatic Therapy

A new and fast developing area of therapy is aquatic therapy. It is found to be extremely beneficial and exciting for children with autism

- **What is aquatic therapy?**
  - The Aquatic Therapy is using water and specifically designed activity by qualified professional to aid in the restoration, extension, maintenance and quality of function for children or adults with acute, transient, or chronic disabilities, syndromes or diseases.
  - Water provides an alternative environment where the body is more supported. Aquatic therapy is always used in conjunction with land based rehabilitation.

- **Why aquatic therapy?**
  - Water immersion is beneficial for memory and cognition
  - Water immersion increases blood supply to brain and heart, activating the parasympathetic nervous system and suppressing the sympathetic nervous system. Immerssion in water helps to reduce anxiety, hyperactivity, repetitive motor mannerisms, stereotypical behavioral and inappropriate emotional responses.
  - Water immersion results in calming of the children on spectrum.
  - Aquatics activities are a fun and enjoyable experience that have many physical, psycho social, cognitive, and recreational benefits. Water activities provide autistic children with proprioceptive and tactile input.

- **Beneficial effects of aquatic therapy for children with Autism**
  - Better Posture, Coordination, and Body Control**:** Because water reduces a child's body weight by 90% while also adding resistance, many therapists report improvement in muscle strength, balance, and coordination.
  - Lesser Sensory Issues: Children with autism tend to over or under react to stimuli in their environment, including light and touch. The warm water and hydrostatic pressure of aquatic therapy help soothe the child in a safe and supportive setting.

As a result, many therapists report an improvement in the child's ability to tolerate touch following aquatic therapy.

- Improved Social Skills**:** Group aquatic therapy has often been used to help in social skill training, promoting engagement and cooperation amongst children. As a result, many therapists note significant improvements in eye contact and self-confidence amongst children.
- Enhanced Cognitive Functions**:** Aquatic therapy has been known to help improve a child's attention span, concentration, impulse control, frustration tolerance and ability to follow instructions.

Fig 1

Fig 2
Exercises in Water

In conclusion, aquatic therapy is safe and easy while allowing for a large variety goals .to be achieved using water

13. Yummy Food For Tummy

Diet plays very important role in Autism as often the nutritional status of children with autism remain compromised.

· Diet related issues in autism

- The common gastrointestinal symptoms are chronic diarrhea/constipation, bloating, gastrointestinal inflammation & pain.
- For many children, when gastrointestinal symptoms occurs negative behavioral changes and cognitive problems are exacerbated.
- Food intolerances, imbalanced biochemistry and digestive problems are at the core of these symptoms.
- These weaknesses in physiological functioning are related to biochemical changes that are affected by diet.
- Diet plays role by addition of required nutrients & removal of offending substances like gluten & protein.

Common nutritional deficiencies	**Causes for deficiencies**	**Sources to correct deficiencies**
Beta Carotene	Chronic diarrhea/ constipation	Sweet potatoes, carrots, red and yellow capsicums, red and yellow colored vegetables and fruits
Vitamin B6	Gastrointestinal inflammation	Green peas, fish, cashunuts, peanuts, pulses, chicken, etc
Vitamin B12	Dietary restrictions due to Sensory issue Selected preference Restrictive intake	Meats, eggs, fish
Folic acid		Nuts and dark leafy vegetables, lentils.

- The most specialized diet commonly prescribed for children with Autism and proved to be successful is Gluten Free Casein Free diet.
- There are several theories as to why the elimination diet may be beneficial. One hypothesis is that autism patients cannot digest gluten & casein, causing the formation of peptides-gluteomorphin & caseomorphin and their absorption into the blood stream.
- These two peptides which appear to have chemical structure similar to opiates can cross the blood brain barrier and cause symptoms like delayed social and language skills & some behavioral issues.

Avoid	**Allowed Alternative**
Gluten (protein) present in wheat, rye, oats, barley and any products made from these	Rice, arrowroot, sago, bajra,Varai, jowar, Ragi, quinoa and singhara atta (water chestnut flour)
Casein (Protein) present in milk & milk products butter, cheese, curd, cream, ice cream	Soy milk, coconut milk, Rice milk, almond Milk, Tofu
Foods Avoided	**Foods Allowed**
prepackaged meats	Eggs, Fresh meat, fresh poultry, and fresh seafood, lentils ,pulses
Tinned and canned vegetables and fruits, vegetable sauces, instant curry mixes	Fresh vegetables and fresh fruits
food additive, colorings, flavour enhancer, monosodium glutamate, sweetener, benzoate preservatives,	Eat fresh, whole foods as much as possible
processed foods	Almonds & walnuts, flax seeds, fish oil
Simple sugars	
food containing immunotoxin e.g Big fish (mercury)	

Fig 1 - Food with gluten

Fig 2 - Food with casein

Fig 3 - Gluten free casein free food

· Points to remember

- Do not include processed foods at all in the diet.
- All foods should be as natural as possible.
- Fruits and vegetables should be given raw and fresh.
- Give small and frequent meals.
- Give plenty of water daily.
- Do not allow children to skip meal.
- Make them chew food properly before swallowing.
- If having difficulty in chewing change food consistency as per need.
- Limit fried foodstuff.
- Slowly decrease intake of sugars and use jaggery or dates for sweetness.
- First include foods mentioned in allowed list.
- Once child starts taking allowed foods in good amount slowly stop avoided food.
- Maintain food dairy.
- Try to incorporate colorful variety of food.
- Read label carefully for gluten & casein.
- All children on elimination diets should be under the care of a nutritionist.

Dietary precautions and compliance to diet considerations can promote over all well-being of children with autism.

14. Exercise Can Be Fun - Physiotherapy

During a Physical Therapy Evaluation a child's neuromuscular and musculoskeletal systems are assessed. The therapist closely looks at child's ability to take in sensory input and control motor output. They assess the facilitating and limiting factors for different gross motor skills, like as walking, jumping, running, stair climbing, and kicking a ball. Through play, the therapist will observe how a child uses his balance reactions, protective reactions, and motor planning skills, and the strategies that the child uses to move in and out of different positions. The therapist also observes the child's posture in a variety of positions, and how the child's posture affects their breath control, oral motor control, and vocalizations. The therapist will analyze which muscle groups are being overused and which muscle groups are being underused. Joint range of motion, especially for overused muscle groups, such as the calf muscles for children who persistently walk on their toes, is measured. Joint laxity is also assessed, especially for overstretched joints, such as for flat feet or for a child who often locks their knees and elbows.

· Commonly observed symptoms with associated symptoms

Signs	Presentation
Postural deviations	➢ Lordotic posture while standing ➢ Kyphotic posture in sitting ➢ Protracted shoulders
Muscle weakness	➢ Scapular winging ➢ Hyperextension of the knees ➢ Reluctance to lift heavy objects ➢ Easy fatigability
Muscle tightness	➢ Neck flexors, ➢ Pectoral muscles, ➢ Hip flexors, ➢ Tendo Achilles
Generalized hyper mobility of joints	➢ Flat feet ➢ Hyperextension of elbows and knees on passive movement ➢ Poor posture ➢ Inability to maintain a correct posture for a longtime

- **Strategies used in executing the therapy session – use parents or care givers to teach the movement**

Fig 1 - Balance exercise (single leg balancing)

Fig 2 & 3 -
Ball throwing and catching to improve coordination with balance training.

Fig 4 - Strategies used to improve motor planning

Fig 5 - Endurance exercises

Fig 6

Fig 7

Balance Exercises

Fig 8 - Strengthening exercises to improve scapular retractors

Fig 9 - Parental help to demonstrate ball pushing to strengthen trunk muscles.

Fig 10

Fig 11

Core muscle strengthening

Fig 12 - Strengthening and stretching of neck muscles

· **What are the potential benefits of physiotherapy for children with Autism?**

- Improve postural control to increase stability during fine motor, gross motor, and self-care activities.
- Improve static balance to improve motor control and motor skills.
- Lay down the foundations of gross motor skills to support participation in community and peer activities.
- Calming and relaxing effect.

To conclude, children of all ages learn through movement and need to master core motor skills in order to maximize their overall potential. Beginning as infants they develop stability so that they can learn to use their hands and feet independently from the rest of the body. They also learn how to manipulate the environment and how to move their bodies within it. They use movement to bond and communicate with others and to explore the world. Limitations in motor skills can lead to difficulty with all areas of development. Physical Therapy can be a beneficial part of a team approach to help children with ASD to be as successful and independent as possible in school, home and in the community.

15. Technology Calling Your Tech Savy Child

Assistive technology is an 'umbrella term' that includes assistive, adaptive, and rehabilitative devices for people with disabilities. Assistive devices are item, piece of equipment, software or product system that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. Children with autism process visual information easier than auditory information. The aim behind using assistive technology is to give them information through their strongest processing area (visual). For people without disabilities, technology makes things easier. And for people with disabilities, technology makes things possible. Assistive devices can be divided into three categories Low tech, Medium tech and High tech Devices

- **"Low" Technology assistive devices**

  - Visual support strategies
  - Typically low cost.
  - Easy to use equipment.

Example: Modified pencils, adaptive paper , coloured sheets, Magnifying glasses, dry erase boards, clipboards, laminated photographs, highlight tape, etc.

Fig 1 - Modified grippers

Fig 2 - Adaptive Paper

Fig 3 - Colored overlay sheets

- **"Mid" Technology Assistive devices**
  - Battery operated devices
  - Simple electronic devices
  - Limited advancements in technology

Example: voice output devices., Tape recorder, Language Master, overhead projector, timers, calculators.

Fig 4 - Naming Objects

Fig 5 - Speech using visual display

- **"High" Technology Assistive devices**
  - Complex technological support strategies
  - Typically "high" cost equipment.

Examples: Tablets, Applications to improve communication., video cameras, computers and adaptive hardware, complex voice output devices.

Fig 6 - Touch Window

Fig 7 - Talking using picture

- Assitive technology helps to improve the writing, reading, communication, learning functional capabilities **positive behavior** of children with autism. Assitive technology helps to make children independent and communicate with others in an efficient manner

16. Building Up a Bright Career for Your Child

Most parents are extremely concerned about the future of their children with Autism. All parents would naturally want their child to succeed in life, have a job of their own and earn to have a self-sufficient life. Children with Autism require specific skill training and support for future employment. Starting vocational training early will help to ensure they are on the road to choosing a career of their choice. This potential is much easier to access when the basics of training is started at an early age.

- **Vocational Training**
  - Vocational training programs begin with a detailed assessment of the person with autism.
  - An important part of vocational training is assessing the skill levels of the child to determine what jobs, or career path may be most appropriate.
  - A skills assessment typically addresses 3 primary areas.
    - Strengths : what are his/her areas of greatest abilities?
    - Interests : what is most meaningful or important to him/her?
    - Needs : what are the areas where s/he requires support?

- **Steps that help prepare the child for employment**
  - Identify job prospects for example, working in libraries, marketplace, typing, maintain computers, etc.
  - Identify mentors to provide training and guidance.
  - Visit different work places for example, assembly line, marketplace, library etc.
  - Take up free online courses, attend community colleges, technical training schools etc.
  - Identify positive skills in your child, highlight them and promote them as their vocational option.
  - Create a portfolio or resume of the person.
  - Practice presentation and interview skills.
  - Practice and train for social skills necessary for the job.

- **What behavioral strategies can be used for career planning?**
  - Make job related skills part of their routine. For example, setting up an alarm clock to ensure that the child gets up in time every morning, which would be beneficial in future.
  - Teach the child to be on a schedule, practice good hygiene, or ordering food. These should be well achieved by the time your child gets his/her first job.
  - Set limits for your child. For example, watching televisions or obsessing over non-functional routines or interests. This would prepare them to keep up with the limits which are usually set at a place of employment.
  - Create daily time table that requires your child to follow a schedule.
  - Have zero tolerance for socially unacceptable behaviors. Do not let go your child's undesirable behaviors by attributing them to autism. Autism should not be an excuse for poor behaviors that will get in the way of being a functional adult.

- **What strategies can be used to teach social skills necessary for future employment?**
  - Teach functional social skills with role play and prompted practice. Settings like scouts/guides or sports, where children are involved in structured activities and have a secondary opportunity to socialize, which will be useful.
  - Direct eye contact can be very uncomfortable for those with autism. Adults with autism who are high functioning often state that they lose comprehension when they have to make eye contact. Explain them about situations where eye contact is mandatory (like a job interview) and have them practice eye contact during role playing.
  - Teach children with autism to read facial expressions and feelings. Children with ASD face difficulty in recognizing and understanding the more subtle aspect of social communication that is facial expression. Expressions like disappointment, questioning or gratitude are completely missed. They have to be taught and practiced specifically.
  - Visual communication system is necessary for complex language and communication skills. Strategies can be referred from previous chapter on speech therapy.

What are the possible career options?

- Finding successful employment in a preferred career of specialized interest may be difficult.
- While the individuals may possess skills in several aspects, those related to their individual interest tends to be very strong and often above average.
- Based on the skills identified, suitable jobs maybe sought.
  - Individuals who have a flair of arts can get into creative jobs like becoming a painter, fashion designer, pottery, musician, etc.
  - Individuals who can give precise attention to details are apt to take up jobs like jewellery designing, pottery, musician, etc.
  - Individuals who are good at following simple commands can take up jobs that require less decision making like sitting at a telephone booth, toll booth, working at a canteen, operating Xerox machine etc.
  - Individuals who are capable of understanding complex systems, and those who have innate flair of technology can take up careers related to the field engineering, such as mechanical engineering, computer programming, systems designs, graphic designs,

hardware servicing etc.

- Individuals those who have a need for repetition can take up jobs like in a packaging industry, cafeteria, printing press which are repetitive in nature and are suitable.
- Those having good language abilities could be journalists in print media.
- Individuals with Autism for whom social interaction and communication is a major issue, working with animals maybe a comfortable and enjoyable field of employment. They may be excellent as veterinaries or veterinary assistants. Others may find their place in the farming industry, animal husbandry or dairy industries.
- Individuals who are very sincere, and who are good with directions could be handed over the work of delivery, paying bills etc.
- Lastly, for individuals with moderate to severe degree of autism, supervised job settings are appropriate under the guidance of a trained supervisor. For example : rug weaving, block printing, making greeting cards, paper bags, envelops , wood carving etc.

The professionals at vocational training facilities and placement centres needs to be aware of all these aspects of individuals with autism. By using a holistic approach towards these individuals, the chances of successful vocational placement and careers increases.

17. Counseling For Parents

The presence of a child with Autism in the family involves significant time and resource demands. In addition to this, stress and conflict accompany the challenges of raising a child with Autism Spectrum Disorder.

- **Family counseling for parents**

  - Stress on families can occur at each stage of a child's life.
  - Each family member and their family relationships faces particular challenges throughout such time period.
  - Siblings may struggle at the feeling of embarrassment and are often jealous at the attention and care their sibling with autism get from their parents.
  - Children with Autism requires calm environment and need family to serve as effective caretakers.
  - Strained family environments may lead the child to act out more and limit their ability to make. developmental progress.
  - Psychologists conduct family counseling to help the family members vent out their emotions, help them to cope with situations better and provide a nurturing environment for their child.

- **Family Counseling can help with issues like**

  - Family relationship and changes in family life
  - Parent's mental health
  - Relationship between the parents
  - Trauma due to their child's illness
  - Issues like stress, anxiety, depression, and grief
  - Stress due to financial problems

• Why parents require family counseling?

Emotional Support for the parents: As much as parents need to be an emotional backbone for the child, parents require emotional support as well. Parents can open up about their feelings as well as learn new coping strategies.

Emotional Support for the child: At some point of time, a child with autism may feel different from other children. This can take a considerable mental and emotional toll on the child. When an entire family participates in family counseling, it gives the child a sense that they aren't dealing with this alone.

- **Understanding the coping strategies:** Counseling is beneficial for the family because the entire family is learning new and effective strategies to teach the child. It won't be nearly as beneficial if the family doesn't know how to implement these strategies. Thus, it should be a team effort where the entire family members should work together for the betterment of the child.

- **Building a stronger family bond:** The reason for counseling is not only the child but it also brings the entire family together. Counseling encourages being open about your feelings and understand the feelings of each other. Doing so with the family builds up trust and a stronger bond.
- Overall, counseling can be hugely beneficial to a child suffering from Autism Spectrum Disorder, but even more beneficial to his or her family together.

• Approaches to Family Counseling

- Supportive family counseling is often used as a way of allowing the family members to talk about their feelings in a safe and caring setting.

- Different approaches to family counseling.

  - Family counseling using Cognitive Behavioral Therapy: It attempts to change the ways people think or behave in order to reduce the problem. Homework task maybe set, or specific behavioral programs are made.
  - Family counseling using Psychodynamic techniques: It tends to look more into the individual's own subconscious minds. It is based on the principle that providing the individuals in the family the real reason behind what is going on, people will be able to deal with their difficulties more easily.
  - Systematic family counseling: It attempts to identify different kinds of problems, relationships, ideas, attitudes and thinking of the whole family. Once these areas are discussed, the therapist will attempt to shift the problems, attitudes, relationships, to a position that is more beneficial, less damaging, or simply make it more realistic. This can be done in a number of ways which include psycho education, experimentation, homework task, etc.

What Parents can do for their child?

- **Being Consistent with the child:** Creating consistency in the child's environment is the best way of reinforcing learning.

  - Find out what the therapist is doing and continue those techniques at home.
  - It is important to be consistent in the way of interacting with the child and dealing with their challenging behavior.

- **Following a schedule :** Setting up a schedule for the child with fixed time for meals , play, therapy, school, and sleep.

  - Disruptions to these routines should be kept at a minimum.
  - Preparing the child in advance if there is an unavoidable routine change.

- **Creating a fun environment for the child**: For both children with autism and their parents, there has to be a life apart from therapy.

  - Schedule play time with the child.
  - Think about the things which make the child laugh, enjoy and come out of their shell and implement it in the child's schedule.

Parent Forums

- Parent's participation in Forums is vital for a child's development.
- Parent forums are parent support groups formed and run by the parents who decide to face the challenges of Autism spectrum disorder and defeat it in all possible ways.
- It also helps new parents to cope with their problems, and share their thoughts and experiences.
- Parent forum gives them a platform to share their ideas and grievance with other parents which gives them a support as well as new strategies regarding how to handle their child and the level of exposure that will help in the child's growth , self-confidence etc.
- Forums are created to help parents who struggle to find appropriate rehabilitation for their child.
- Thus, joining an autism support group is a great way to meet other families dealing with the same challenges. Just being around people with similar experience can go a long way towards reducing the isolation many parents feel after the diagnosis of their child.

Fig 1 - Family Counseling

It is almost equally important for parents to take care of themselves to be able to care for their child with autism.

18. Medical Management

Until now there are no medicines available to cure autism. All the medicines provide only symptomatic relief. However, treatment of symptoms is important as it is the distressing symptoms that limit the quality of life of people with autism, their families and caregivers.

The most commonly used prescription medicines are different types of antipsychotics, antidepressants, stimulants, mood stabilizers, anticonvulsants, Glutamate antagonists, vitamin and mineral supplements, etc.

- **Antipsychotics**
  - Risperidone and Aripiprazole are the only two US FDA approved medications for Autism.
  - They are used to treat irritability that is associated with behavioral problems like aggression, self-injury, temper tantrums and mood swings.
  - They act on the chemical substances which carry signals across nerve connections serotonin and dopamine, which have been found in abnormal levels in many individuals with autism.
  - The most common side effects of Risperidone and aripiprazole include drowsiness, constipation, fatigue, hyperglycemia and weight gain. In some individuals serious side effects like tremors, abnormal involuntary movement and rigidity have been observed.
  - Other Anti-psychotic medicines used to control aggression and hyperactivity are Clozapine, Olanzapine, Quetiapine and Ziprasidone.

- **Antidepressants**
  - Antidepressants can be used to treat depression,anxiety and obsessive compulsive disorder in autism.
  - Selective Serotonin Reuptake Inhibitors (SSRIs) are commonly used for treatment in autism. They include drugs namely Fluvoxamine, Fluoxetine, Citalopram, Escitalopram and Sertraline.

- Treatment with these medications may help decrease frequency of repetitive behavior and improve eye contact and social interaction.
- Side effects of SSRIs include anxiety, insomnia, nausea, vomiting, diarrhea, apetite and weight changes, mania or hypomania, aggressive behaviour. Suicidal ideation has not been reported as a possible side effect in studies on SSRIs in autism.
- Other drugs prescribed are Nortriptyline, Amitriptyline, Clomipramine, Desipramine, and Imipramine.

· Stimulants

- Drugs such as methylphenidate, amphetamine, and dextroamphetamine belong to the category of stimulants which act on the dopamine system and are primarily used to treat hyperactivity and inattention.
- However, adverse effects such as loss of appetite, sleep difficulties, irritability, emotional outbursts, anxiety, depression, headache, and diarrhea have been reported.

· Mood Stabilizers

- This group of drugs can be used to treat behavioral symptoms such as aggression, self-injurious behaviors, impulsivity and conduct disorder.
- Mood stabilizers possibly used include lithium, lamotrigine, valproic acid, carbamazepine, topiramate, oxcarbazepine and levetiracetam

· Antiepileptics

- Antiepileptics are usually prescribed to control seizures associated with autism.
- Commonly used Antiepileptics in autism are sodium valproate and phenytoin.
- These drugs have also shown improvements in the various core symptoms such as receptive language, affective instability, aggression, and social skills.
- Side effects of these drugs are a major concern. Routine liver function tests should be performed before and during treatment. Monitoring the drug levels through regular blood tests becomes necessary.
- Other drugs used are levetiracetam, topiramate, carbamazepine, lamotrigine, clobazam, etc
- Midazolam nasal spray may be prescribed to keep handy with parents for emergency or during travel.
- Divalproex sodium, an antiepileptic, is also prescribed to control hyperactivity.

· Glutamate antagonists

- Glutamate antagonists used for autism are amantadine, memantine.
- They lead to improvement in memory, hyperactivity, irritability, language, social behavior and
  selfstimulatory behavior.
- Few patients were reported to have experienced adverse effects like worsening of autistic behaviors.
- Some of the other adverse effects include nausea, diarrhoea, hyperactivity and irritability.

- **Sedatives**
  - Medicines like melatonin are prescribed in case of disturbed sleep cycle.
  - Triclofos is helpful to put the child to sleep during travel and also for insomnia.
  - Promethazine and haloperidol can be used when child is extremely aggressive, violent, excessively hyperactive or around any medical procedures.
  - These medicines have to be used very carefully and under supervision of a doctor only.
  - The side effects can be excessive drowsiness, day time sleepiness, fatigue, lethargy, etc

- **Non- prescription medicines**
  - These are mainly the vitamin and mineral supplements which may help in controlling various symptoms of autism.

- **Omega-3:**
  - Omega-3 plays an important role in the functioning of the brain. It also reduces inflammation and thus improves immune balance in autism.
  - Omega-3 supplementation improves cognition and motor skills, concentration, eye contact, sociability and sleep, along with reducing hyperactivity, repetitive behavior and aggression.

- **Folic acid:**
  - Folic acid is essential for appropriate brain development.
  - It shows significant improvement in receptive and expressive language.

- **Vitamin B12:**
  - Individuals with autism may be associated with deficiency of vitamin B12 due to poor dietary intake, poor absorption, or metabolic abnormalities.
  - Methylcobalamin is the most active form of vitamin B12, which is required for healthy development of brain, immune system and nervous system.
  - These supplements may help in controlling the behavioural symptoms in autism.
  - These can be given in the form of injections or tablets

- **Vitamin B6 and Magnesium**:
  - The combined intake of vitamin B6 and Magnesium may result in improving social interaction, communication, alertness, self mutilation and repetitive behavior.
  - Side effects of high dosages can cause neuropathy and diarrhea.

- **Vitamin C:**
  - It is an antioxidant which prevents oxidative damage in brain, reduces metabolic stress and improves immunity.
  - It may help improve repetitive behavior in children with autism.

- **Vitamin E:**
  - It is also an anti oxidant.
  - It helps in neurodevelopment of the brain and immunity.
  - It has shown to improve speech and behavior in autism.

- **Zinc:**
  - Zinc deficiency is commonly observed in autism.
  - It is one of the important components for neuronal functioning.
  - Zinc supplements improve cognition and reduce hyperactivity.

- **Iron supplements:**
  - Iron deficiency has been observed in some children with autism.
  - This may be associated with psychomotor retardation, poor sleep, and neurological and behavior problems.
  - It has shown to improve sleep significantly without any side effects.

- **Multivitamins/mineral supplements:**
  - Vitamins/minerals supplementation helps improve symptoms of self-injurious behavior, aggression and tantrums.

- **Dimethylglycine (DMG):**
  - DMG is also known as Vitamin B15
  - It increases oxygen uptake in the blood and increases circulation.
  - DMG supplements may improve eye contact and social interaction, improve speech communication and increase tolerance and decrease aggressive behavior.

- **Probiotics:**
  - Probiotics are microorganisms which improve digestion and immune system.
  - They help to reduce self stimulatory behavior, aggression, stereotypical behavior, hyperactivity and improve socialization.

- **Coenzyme Q10:**
  - It is a mitochondrial enzyme required for optimum cellular functioning.
  - It helps to reduce irritability; and improve communication and socialization.

The prescription drugs have to be taken with caution and under supervision of a doctor only. Vitamins and other supplements can be taken in combination as advised by the doctor.

SECTION C

Regenerating and Re-patterning of the Brain

Recent Advances In Treatment of Autism

The understanding about "why autism occurs" and "what happens in autism" has been evolving over the years. Though the first question has not been answered yet, but the second is being better understood now. We now know that there are certain areas in the brain which are functioning less (cerebellum, hippocampus and amygdala), which results in the problems , such as lack of communication, abstract thinking and social interaction. Hence, a shift in treatment path / strategy is also taking place. Apart from holistic rehabilitation techniques, which help pattern behaviors and sensory outputs from outside, we find now, the emergence of interventions which can help systemically (from inside) to re-pattern / repair the damaged brain from inside and improve the brain function. These newer interventions are stem cell therapy (as a part of regenerative medicine), Hyperbaric oxygen therapy (HBOT), chelation therapy and neuro-feedback therapy. Together, the new advances in synergy with the old techniques, provide a good platform for children to improve and attain there goals.

19. Stem Cell Therapy in Autism

Frequently asked questions and their answers

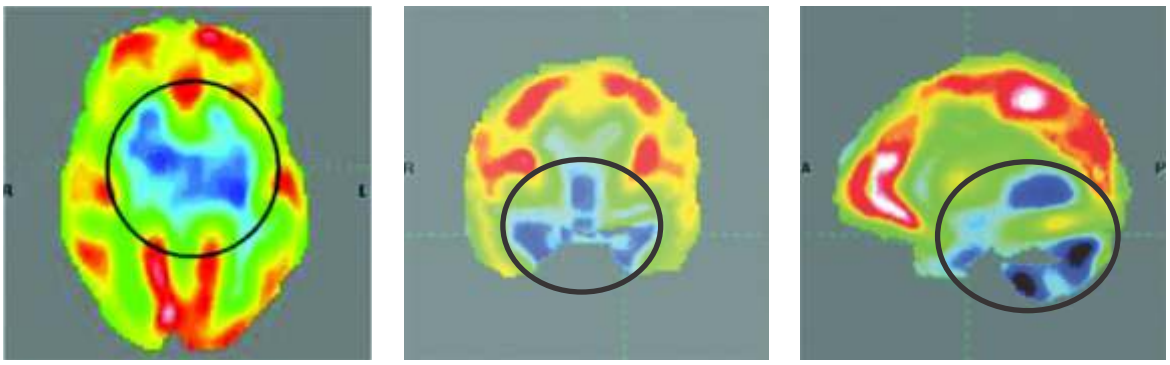
(A) General Information on Stem Cell Therapy

1) What is stem cell therapy?

Stem cells are cells that help to repair, regenerate and replace damaged cells.
Stem cell therapy (also called cell therapy / regenerative medicine) works on the principal of using healthy cells to repair damaged cells, thereby bringing about a biological healing.

2) How do stem cells help in autism?

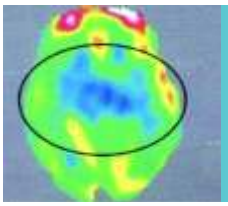
(i) Below is a picture of a PET CT scan image of a brain of a child with autism in which the blue area shows part of the brain that is damaged in autism.



PET-CT Scan showing damage in the brain of a child with autism.
This is represented by the blue color depicting hypometabolism.

Fig 1

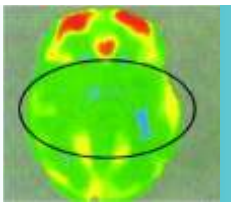
(ii) 6 months after Stem Cell Therapy, when the PET CT scan is repeated, it shows that the blue hypometabolic part which was earlier damaged has now been repaired and is functioning normally.



PET-CT Scan of the brain before stem cell therapy

Fig 2

The areas in blue show damaged part of the brain that is responsible for cognitive development, comprehension and emotional expression.



Improvement seen after stem cell therapy

Fig 3

Reduction in the blue area suggest repair of the damaged part which correlates with the clinical improvements seen after Stem Cell Therapy such as learning, cognition, understanding & emotional behaviour

3)What does stem cell therapy do that only rehabilitation and medicines cannot do?

The outcome of conventional medical treatments and rehabilitation therapies is limited in autism. They only help in management of symptoms but do not correct the core fundamental problem of hypo metabolism (damaged brain). Whereas, stem cell therapy addresses this core underlying issue by improving the brain metabolism and make the previously hypometabolic areas normal. Improved metabolic activity, thus result in functional recovery in individuals affected with autism. Once this damage is repaired, these individuals may respond better to the conventional treatments and result in enhanced recovery.

4) What are different type of Stem Cells?

Stem cells are broadly classified into four types

A) Embryonic stem cells

B) Umbilical cord derived stem cells

C) Adult stem cells

D) Induced pluripotent stem cells

Embryonic stem cells have various ethical and safety issues. Therefore, they are not used widely. Adult stem cells are the most widely used types of cells due to their abundant availability and obtainability.

Stem cell transplantation can be of two types

i) Allogenic (Stem Cells obtained from a donor)

ii) Autologous (Stem Cells obtained from the patient's own body)

Autologous stem cell transplantation is safe as it does not involve the risk of rejection.

(At NeuroGen BSI we use only autologous bone marrow stem cells which are safe and feasible).

5) What is the mechanism of action of Stem Cells?

a) Releasing certain useful molecules known as trophic factors.

b) These molecules help in regulating the immune system which is dysregulated in autism.

c) They also help in decreasing inflammation and oxidative stress

d) Improve the blood and oxygen supply to the damaged parts of the brain by a process called angiogenesis which is formation of new blood vessels.

e) Multiply and differentiate into nerve cells.

(B)Information on Stem Cell Therapy done at NeuroGen BSI

6) How is stem cell therapy done?

This is a one-day procedure done in 3 simple steps with only 2 injections. There is no surgery or stitches involved.

Step 1 **Step 2** **Step 3**

Fig 4

- **Step1: Bone marrow aspiration: (done in the operation theatre)**

This is done by putting a needle into the hip bone, after making the area numb with local anesthetic, so that the patient does not experience pain. The bone marrow is aspirated from inside the bone which takes about 20 minutes.

- **Step 2: Stem cell separation: (done in the stem cell laboratory)**

The bone marrow removed from the patient is taken to the Stem cell laboratory, where the stem cells are separated from the remaining cells of the bone marrow by the density gradient method. This takes about 3 hours.

- **Step 3: Stem cell injection: (done in the operation theatre)**

Injection of stem cells into the spinal fluid is done by a very thin needle at lower back level

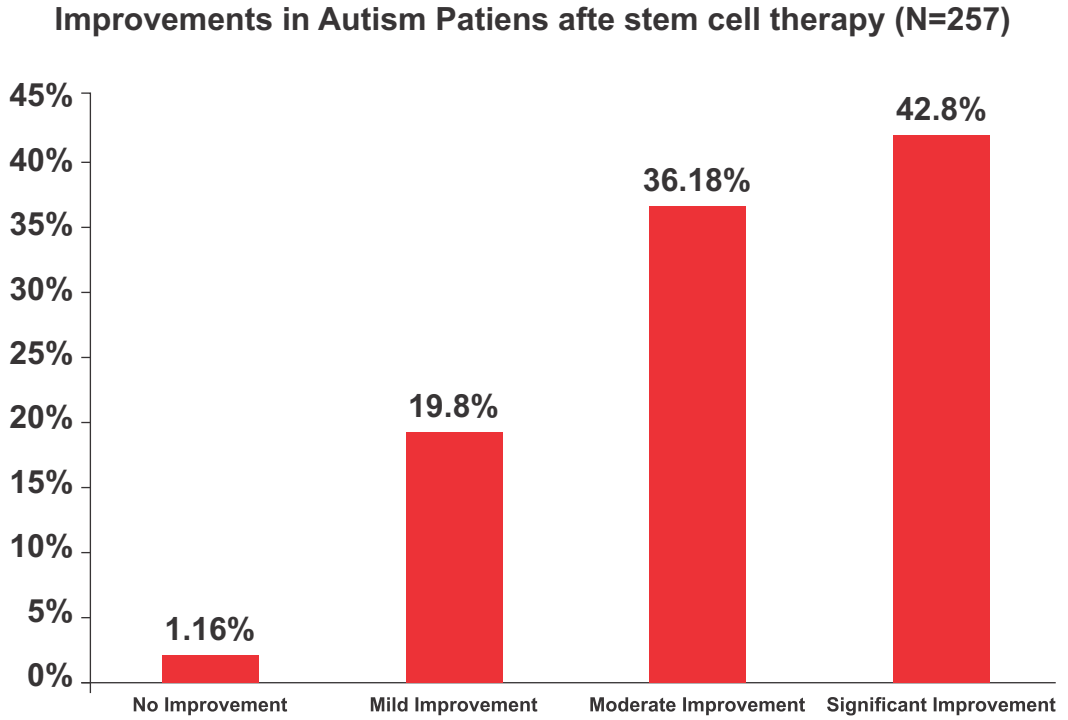
(L4-5 space) after giving local anesthesia. The stem cells are injected this way which takes about 20 minutes.

7) How safe is stem cell therapy?

When the type of stem cell therapy done is the autologous type (cells taken from and injected into the same patient) then there is no risk of any major irreversible side effects or complications. At NeuroGen BSI we only use this safest form of autologous bone marrow derived stem cell therapy. However, there were incidences of increased frequency of seizures reported in few patients who already had a history of seizures before stem cell therapy. These were medically taken care of and did not have any impact on the improvements. Hence, all the patients with previous history of seizures and/or abnormal EEG are given prophylactic anti epileptics as a part of the protocol which significantly reduces the possibility of occurrence of seizures after stem cell therapy.

8) What is the success rate of stem cell therapy in autism?

At NeuroGen BSI the success rate of stem cell therapy in autism is as shown in the graph and the table below.



Symptoms	Percentage Improvement
Social Interaction	67.3
Eye Contact	81.06
Attention/ Concentration	83.41
Stereotypical behaviour	54.3
Aggressiveness	59.04
Hyperactivity	66.49
Self-Injurious Behaviour	61.33
Sitting Tolerance	87.93
Command Following	85.43
Speech	60.48
Communication	61.27
ISAA	94.23
CARS	95.67

Fig 5

9) What symptoms of autism show improvements after Stem Cell Therapy?

There is a significant improvement in the following symptoms in the patients of autism treated at NeuroGen BSI:

- Hyperactivity
- Eye contact
- Attention span
- Speech and communication
- Response to commands
- Overall behavior
- Fine motor activity
- Self stimulatory behavior
- Social awareness as well as interaction with peers
- Cognition and understanding
- Improvement in academic performance at school.

10)What are the objective improvements seen after Stem Cell Therapy?

As already mentioned earlier PET CT scans of the brain show an improvement in the hypometabolic (damaged) brain in majority of the patients who have been treated with stem cells. Below are the images indicating the objective improvements.

The blue areas indicate hypometabolism which after stem cell therapy turn green which indicate normal brain metabolism.

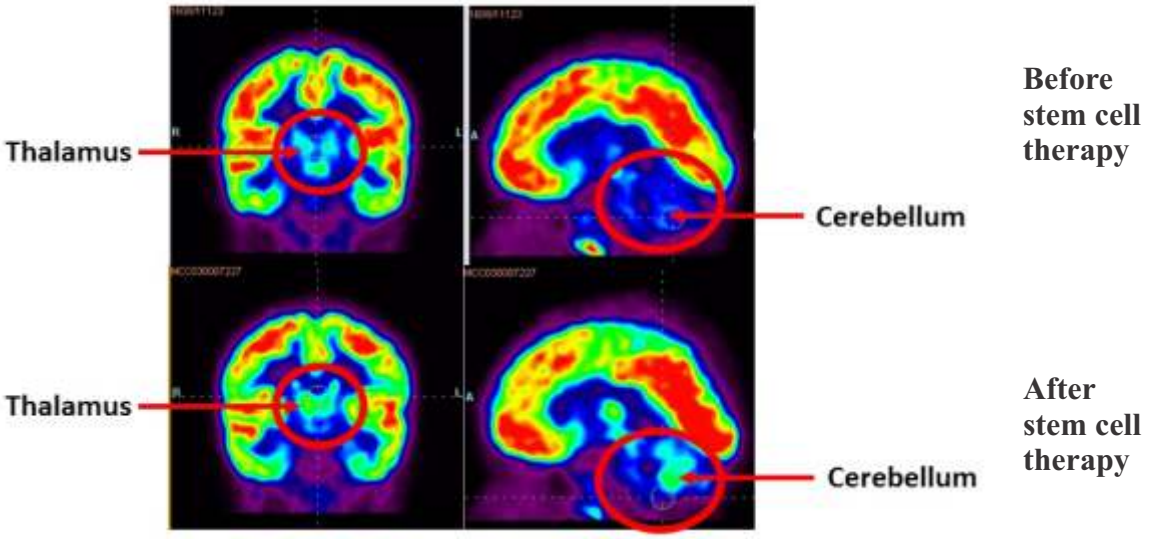


Fig 6: Comparative PET CT scans of an autism patient performed before and after stem cell therapy. Significant improvement was observed in medial temporal, thalamus and cerebellum.

11)What is the scientific evidence that stem cell therapy works in autism?

Our clinical results showing safety and efficacy of stem cell therapy in autism have been documented in fifteen scientific papers published in international and national medical journals. The first paper in the world publishing the results of stem cell therapy in autism was published by NeuroGen Brain and Spine Institute. The full text of these articles can be reviewed at www.stemcellspublications.com

12)How many patients of autism have been treated at NeuroGen BSI?

We have treated over 1300 patients of autism from many different countries across the world.

Children from 5 different continents undergoing treatment at our centre at the same time.

13) What is the assurance of quality of Stem Cell Therapy services at NeuroGen BSI?

a) NeuroGen BSI is ISO 9001:2015 certified

b) The Stem Cell laboratory at NeuroGen BSI has both the following certifications:

(i) GLP (Good Laboratory Practice)

(ii) GMP (Good Manufacturing Practice).

(C) Information to help you make informed decisions.

14) How should I decide whether my child having autism should undergo stem cell therapy?

If despite all attempts at rehabilitation and special education the child still has limitations that are not letting the him/her integrate into main stream living and education then it might be worthwhile considering stem cell therapy as an option. In addition, if the PET CT scan of the child's brain shows moderate to severe degree of hypometabolism also then stem cell therapy can be an effective mode of treatment.

15) How should I choose a good center for stem cell therapy for my child?

The following criteria should be kept in mind:

- The center should be using the safer type of stem cell therapy which is the autologous type of adult stem cell therapy.
- The center should have an established track record of treating many patients with proven safety and efficacy.
- The center should have published their clinical results in peer reviewed medical and scientific journal in both international and national journals.

List of 10 Scientific Publications in medical journals published by NeuroGen BSI documenting the safety and efficacy of cell therapy in Autism

1. Sharma A, et al., The baseline pattern and age related developmental metabolic changes in the brain of children with autism as measured on positron emission tomography/computed tomography scan. **World J Nucl Med** 2018;17
2. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Sarita Kalburgi, Ridhima Sharma, Prerna Badhe, Samson Nivins. PET CT Scan Brain As A Monitoring Tool To Study The Effects Of Autologous Bone Marrow Mononuclear Cell Transplantation In Autism Spectrum Disorder. **International Journal of Current Advanced Research.** Sep 2017 (In Press).
3. Alok Sharma, Nandini Gokulchandran, Pooja Kulkarni, Sarita Kalburgi, Shruti Kamat, Riddhima Sharma, Samson Nivins, Hemangi Sane, Prerna Badhe. "Improvements in a case of autism spectrum disorder after cell therapy as noted on PET CT brain scan" **SJSC.** May 2017
4. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Suhasini Pai, Vaishali Ganwir, Prerna Badhe. A case of autism showing clinical improvements after cellular therapy along with PET CT evidence. **Journal of Stem Cell Research & Therapeutics.** April 2017
5. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni and Suhasini Pai. Stem Cell Therapy in Autism Spectrum Disorders. Recent Advances in Autism. **SMGroup.** 2017
6. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Avantika Patil, Pooja Kulkarni, Amruta Paranjape PET- CT scan shows decreased severity of Autism after autologous cellular therapy: A case report. **Autism Open Access** 2016; 6:169.
7. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Avantika Patil, Akshata Shetty, Hema Biju, Pooja Kulkarni, Prerna Badhe. Amelioration of Autism by Autologous Bone Marrow Mononuclear Cells and Neurorehabilitation: A Case Report. **American Journal of Medical Case Reports**, 2015, Vol. 3, No. 10, 304-309
8. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pradnya Bhovad, Hema Biju, Akshata Shetty, Mrudula Kali and Prerna Badhe. Cell therapy effects portrayed on positron emission tomography computerized tomography scan of the brain serve as a new dimension for autism: A case report (2014), **Journal of Paediatric Neurology,** 12:3.
9. Sharma A, Gokulchandran N, Shetty A, Kulkarni P, Sane H, Badhe P. Neuropsychiatric Disorder Tackled by Innovative Cell Therapy-A Case Report in Autism. **J Stem Cell Res Transplant.** 2014;1(1): 4.
10. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Pooja Kulkarni, Nancy Thomas, Amruta Paranjape, Prerna Badhe. Intrathecal autologous bone marrow mononuclear cell transplantation in a case of adult autism. **Autism open access.** 2013, 3:2.
11. Alok Sharma, Nandini Gokulchandran, Akshata Shetty, Hemangi Sane, Pooja Kulkarni and Prerna Badhe. Autologous Bone Marrow Mononuclear Cells may be Explored as a Novel. Potential Therapeutic Option for Autism. **J Clin Case Rep** 2013, 3:7.
12. Alok Sharma, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni, Priti Mishra, Akshata Shetty and Hemangi Sane. An Improved Case of Autism as Revealed by PET CT Scan in Patient Transplanted with Autologous Bone Marrow Derived Mononuclear Cells. **J Stem Cell Res Ther** 2013, 3:2.
13. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Anjana Nagrajan, Amruta Paranjape, Pooja Kulkarni, Akshata Shetty, Priti Mishra, Mrudula Kali, Hema Biju, Prerna Badhe. Autologous bone marrow mononuclear cell therapy for autism – an open label proof of concept study. **Stem cell international.** 2013 (2013), Article ID 623875, 13 pages.
14. Alok Sharma, Guneet Chopra, Nandini Gokulchandran, Mamta Lohia, Pooja Kulkarni. Autologous Bone Derived Mononuclear Transplantation in Rett Syndrome. **Asian Journal of Paediatric Practice.** 2011; 15 (1): 22-24.
15. Dr Alok Sharma , Dr Nandini Gokulchandran , Dr Hemangi Sane , Ms Pooja Kulkarni , Mr Samson Nivins , Ms Maitree Maheshwari , Dr Prerna Badhe.Therapeutic effects of cellular therapy in a case of Adult Autism Spectrum of Disorder. **International Biological and Biomedical Journal.**(In Press)

20. Hyperbaric Oxygen Therapy in Autism

Fig 1 - HBOT Chamber

Hyperbaric oxygen therapy (HBOT) is a safe, effective and a non invasive intervention used in a wide variety of medical conditions including Autism.

- Hyper" means more and "Baric" means pressure, i.e. this therapy uses pressure to distribute more oxygen into brain, blood, cerebrospinal fluid, etc.
- The patient inhales 100% oxygen at a pressure three times greater than normal atmospheric pressure in an enclosed, specialized designed, pressurized chamber.
- The chamber is a closed space as shown in the below figure. The child and the parent stays in the chamber for around 45 minutes. Children can watch TV, read a book, play

video games or sleep inside the chamber during the session.

- The pressure in the chamber increases slowly so it is not uncomfortable.
- Usually HBOT treatment involves 40 sessions. One session per day of around 45 minutes.
- HBOT works by improving oxygen supply to the less functioning areas of the brain. It improves circulation in the brain and helps in toxin removal. It also decreases the inflammation of the brain.
- The body's healing process improves with more oxygen supply.
- This improves neurological functions, cognition, memory, etc
- Side effects of HBOT include fatigue and lightheadedness. More serious complications can include: Damage to the lungs, buildup of fluid or rupture of the middle ear, damage to the sinuses, changes in vision, causing nearsightedness, or myopia, oxygen poisoning which can cause lung failure, fluid in the lungs, or seizures.
- Scientific studies have shown that HBOT treatment in children with Autism can reduce hyperactivity, improve behavior, reduce aggression and improve communication.
- But unfortunately it is still not a cure for Autism. Yet we can use this treatment to improve overall functioning of our children with Autism.

21. Neurofeedback

Recently many new modalities of treatment are being investigated for autism. One of them is neuro-feedback which trains the abnormally functioning areas of the brain in the children with autism. This is a very novel technique which has to be used with caution & only after gathering a lot of information about it. This treatment should only be done under the guidance of experts.

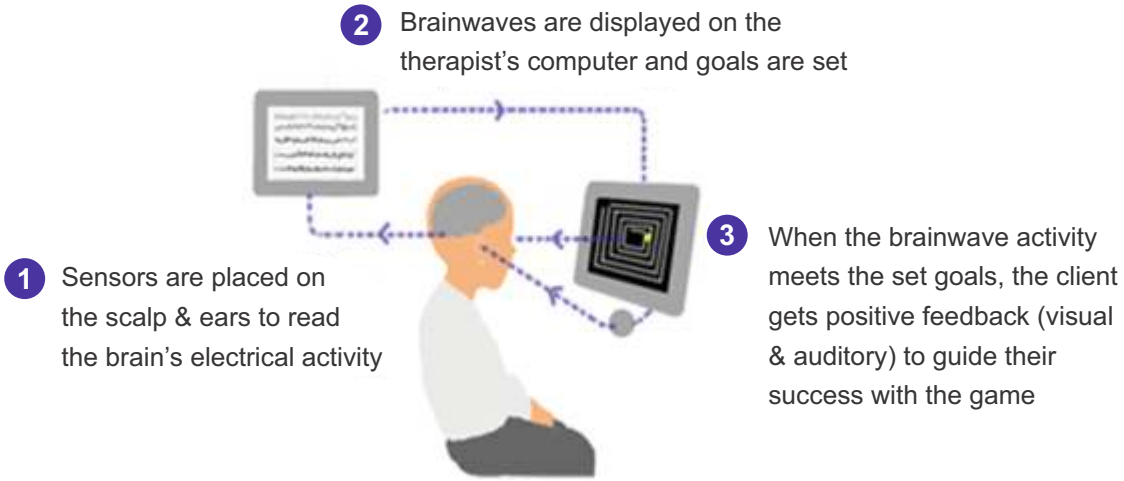


Fig 1 - Neuro-feedback Unit

- It is a technique in which the brain is trained to improve its functionality.
- It modifies the brain function and thereby improves behavior that is appropriate to the external occasion.
- It improves neuroplasticity of the brain.
- It helps in reducing hyperactivity, mood swings and improves attention span in autism.
- The procedure involves placing EEG electrodes on the scalp and recording the brain signals with various audio / visual stimuli. There is now a quantitative EEG (QEEG) available which is more sensitive and specific to know which areas of the brain are abnormally functioning. According to this information neurofeedback program, specific to train these abnormal areas is prepared.
- By using video or sound a desired brain activity is given a positive feedback and undesired activity is given a negative feedback.
- Neurofeedback sessions are usually given over six months to see effectiveness.
- There are no major side effects of Neurofeedback but some children may have fatigue, nausea, dizziness, irritability etc.
- Children who have history of seizures may be at a higher risk of getting seizure with neurofeedback treatment.
- This is still a very new modality of treatment and requires an expert in this field.
- This is also an expensive and a long duration treatment and the results of this treatment are yet to be established.

22. Chelation

Chelation has been used in medical field for lead poisoning, other metal toxicity since many years. This has been recently tried for autism due to the hypothesis of relation to mercury toxicity. Some people believe that autism is associated with vaccination of MMR. Though scientific studies have failed to prove any association of MMR vaccine to autism. The mercury toxicity from the vaccination was the possible explanation. Lead poisoning can also cause symptoms of autism. Therefore chelation is one of the options in children with tested and documented heavy metal toxicity.

- Chelation is a process for removing heavy metals from the blood and is used in treating heavy metal toxicity in autism patients.
- It is essential to evaluate the child for heavy metal toxicity prior to administration.
- Chelation involves a series of injections, of Dimercaptosuccinic acid (DMSA) or ethylenediaminetetra aacetic acid (EDTA) which removes metals from the blood through subsequent urination.
- Elimination of the toxic metals may result in improved language, cognition, and sociability in individuals with autism.
- Chelation therapy may have severe adverse effects like renal and hepatic toxicity, fatigue, and diarrhea, abnormal complete blood count, mineral abnormalities, seizures, sulphur like smell, regression, gastrointestinal symptoms and rash.
- This therapy can cause major side effects so, it can be done only by an expert doctor.

SECTION D

Let's Hear It From The Parents

Vaibhav is my eight year old son. He was born as a normal healthy child. As he grew up, my husband and I started to notice that something was amiss. He showed a delay in physical and social development. His slowed development, lack of any speech and poor responses at the age of two years concerned us. We took him to a pediatrician; and after a few tests and some examinations, he was diagnosed with autism. This was difficult to understand for me and my family. He was started on occupational therapy, physiotherapy and speech therapy as per the doctor's recommendations. By the age of three he started to stand and he was four and a half years old when he began to walk. We were worried about his future, schooling and how he would cope in a new environment because he did not interact with others, mostly remained aloof and could speak only few sounds (monosyllables). We initially put him in a special school but going there, his behavioral problems only increased. We shifted him to a regular school where the teachers specifically managed his problem behaviors. He was responding well to school but still several problems hindered his performance and participation. He had poor eye contact, repetitive behaviors, hyperactivity and poor attention and concentration. He was unable to relate to, interact with or play with other children of his age. He was very fearful of

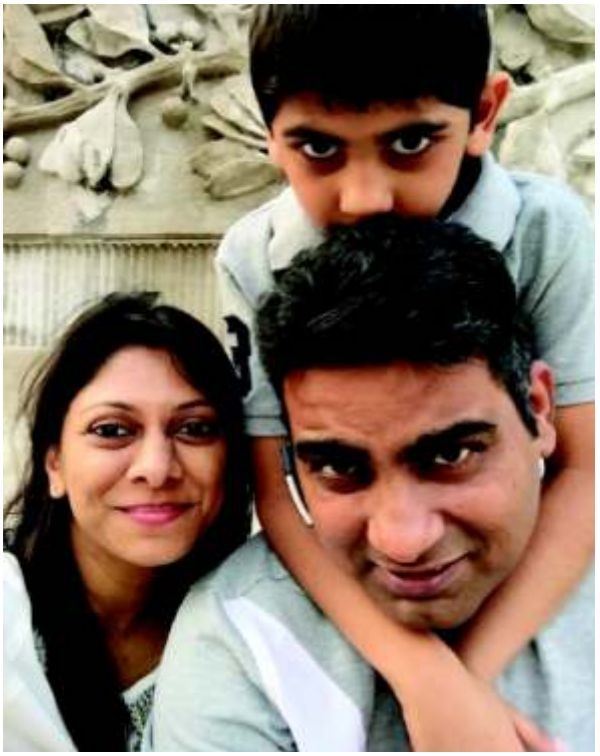
climbing stairs. We were unable to train him for daily activities like brushing, eating, toileting, etc. We were looking for some better treatment options when we learnt about stem cell therapy at NeuroGen Brain and Spine Institute. We had several doubts about the treatment procedure, effectiveness, safety, etc; all of which were cleared and explained to us in detail by the doctors and therapists. A few tests were conducted and the procedure was done for Vaibhav in July, 2012. Advice on management at home and further therapies to be continued after stem cell therapy were given. Therapy and recommendations from the psychologist, occupational therapist, speech therapist and dietician were followed. Within three months of having taken stem cell therapy we began to notice some improvements in him.

Eye contact improved noticeably, especially to people whom he recognized. His attention span got better; previously he was never able to attend to a writing task. Previously, while coloring within a circle, he wouldn't be conscious of the borders but now he developed the awareness and started to color inside the circle. His color matching skills improved. Boredom would make him restless and wander up and down but slowly he learnt to engage himself with an activity. Drooling stopped completely and tongue movements got better. Now he chews food on the left side as well, which was previously difficult. His imitation of sounds is better with the speech therapist. His recognition and awareness about his surroundings has increased. His fears had reduced; he was able to step onto the pavement while crossing the road. Even the fear of climbing stairs almost completely disappeared. His cycling and skating abilities were better as compared to before (i.e.) his stamina and balance had improved. Previously, while bathing he would not like to hold a scrub and a soap but slowly he became tolerant to them and even assisted in bathing. His grip has become better; previously the pen or pencil would slip from his hand. Command following has improved; previously he would follow commands like "sit down", "get up", "go back", etc. Now he follows even slightly more complex ones like "bring me the water jug", "pick up the sandal", "take your sandal outside and wear it". Previously commands needed to be repeated a couple of times but now he follows it up immediately. Vaibhav started to interact with other children. He began sitting in a group and would even tickle

other children. We have notice some development of emotions like happiness, respect, etc. which were not present before. He is even aware about having soiled his pants. A few steps of toileting like undoing his pants in the toilet have been learnt by him.

Six months after therapy many more positive changes occurred. His understanding of concepts of addition and multiplication improved. He was able to understand and perform exercises related to grammar. Vocabulary and imitation skills improved. He was able to recognize animals, birds, etc. Body tone improved and posture got better. Sitting tolerance for an activity increased to half an hour at a stretch. Earlier I had to supervise his activities even at home. Now I can let him be unsupervised, even at the playground. The prompts required during activities like eating, brushing, dressing-undressing, has reduced. We were also told that changes were recorded on the PET-CT scan of the brain. All these positive improvements gave us confidence. We are hopeful and know that Vaibhav will make his way through. We are even planning to get a second round of stem cell therapy for him as we believe that there is more scope for improvement with this intervention. My husband and I are grateful to the entire team at NeuroGen for their help and support.

- Mrs. Salunke
(Vaibhav's mother)



We always hoped our son Ashvik should be able the see the world as we do and should be independent. At NeuroGen Brain and Spine Institute we got this faith. Ashvik was a week premature and had a birth history of neonatal meningitis and was in NICU for 14 days. Once he was home things seemed fine. He being our first and only child, we didn't know what milestones to look for though the pediatricians informed us that he had delayed developments. At the age of 3 ½ years for a school admission process we had his medicals done and he was diagnosed with CVI (Cortical Visual Impairment). Our world came to a standstill when we heard this. We went all over the internet finding information on CVI and in India there didn't seem to be much. Our Ophthalmologist said we cannot treat him as there was no treatment. Ashvik was a very smart child, communicated well but used to struggle in his daily activities due to his vision, fine motor and other behavioral issues. He used to get easily frustrated was very hyper active, sensory processing disorder and his attention span was very poor. We were informed by his school to give him some occupational therapy so that his attention span increases.

Since Ashvik spoke well none of the doctors we took him to ever told us that Ashvik might also have Autism but we kept looking into the internet and saw that he does fall into few ASD (Autism spectrum disorder). He would always line up his toys in a particular order, would not want to share his toys with his friends, would not wait for his turn at a playground, would have lots of meltdowns, and no eye contact. But we as parents often thought it was related to his vision and CVI and didn't think much about Autism. When we got to know about a CVI specialist in USA that's when we decided we should move to USA as we didn't have any treatment option for CVI for Ashvik in India and we were in the belief that Autism has no treatment anywhere in the world. We have been in USA for more than a year and this year in April 2015 we decided to go to India for a holiday. We learned about NeuroGen through a newspaper cutting that my mother - in - law

had saved to show us when we came to India. When we met Dr Alok Sharma at NeuroGen we started to believe that the issues Ashvik had can be treated. Ashvik was 7 yrs old when he underwent his first stem cell on 4th May 2015 and it's been only 3 months and we have already seen lot of improvements in him. In all areas of concern (vision, fine motor, attention span, hyperactivity) he has shown improvement, vision being the most prominent. He can now see better as he can point out and identify small objects and also locate objects that are far away. He has begun to have his food on his own using a spoon and with some assistance. He can hold conversations with his peers and likes to play with other kids unlike earlier where he would not like playing with kids. He also has begun to tolerate sound well earlier he would not be able to tolerate sound of a mixer and shut his ears whereas now he can stay in the kitchen even when mixer is running. His attention span has increased and he can stay at one place and concentrate well even at school. He also uses the Ipad independently, earlier he found it difficult and needed assistance. He is very close to getting independent in brushing, cleaning after toilet, bathing and wearing his clothes. We always hoped our son Ashvik should be able to see the world as we do and should be independent. At NeuroGen Brain and Spine Institute we got this faith. We have seen many positive improvements in Ashvik after stem cell therapy and are looking forward to see more and we are very positive and confident that Ashvik will be soon independent and will grow up to be a very good human being. As we had hoped, his vision has been improving over a period of time (he has cortical blindness along with autism). Along with reduction in hyperactivity, we have noted improvements in attention span, eye contact, cognition, imitation skills, ability to interact with peer and adult. Ability to perform fine motor as well as gross motor tasks has also improved. Most importantly, behavioral issues have become less, which has lead to fewer melt downs in the last 10 months. We are grateful to Dr. Alok Sharma and his team for the treatment and the wonderful and memorable experience at NeuroGen Brain and Spine Institute.

Mrs Rekha Tripathi
(Ashvik's Mom)
Indianapolis, USA

"I take pride in saying that my son, with autism,after treatment, tutors visually impaired and mute children." Being a mother is the one of the happiest moments of one's life. It took me to a world beyond thoughts. Arrival of my baby boy was a blessing. Everyone at home was so happy. Their faces were beaming with the joy. Soon we named our baby Shantanu. As he grew older, we slowly realized that our baby was not talking nor playing like the other children of his age. Something was wrong, and we wondered what? He looked absolutely fine, just like any other kid but, his behavior was very different and we knew there was definitely something wrong. He did not play with the other children at school. It used to pinch my heart to see him lost in himself and alone. How I wished he would call out to me in his sweet baby voice, but never even did he look at us. As he grew older, he constantly wandered by himself within the house. Slowly even other children realized that he was different. They stopped playing with him. It used to hurt me deeply. His loneliness was very painful for me. Even after visiting many doctors repeatedly, there was a still a question mark in my mind about the reasons for his behaviors. It took us too long to find out the exact problem. When he was six years old, we found out that he had 'Autism'. We were completely crushed after finding out that our son cannot learn like normal children. It seemed like the end of everything and we didn't know what to do next. Every doctor we consulted had a different opinion about his problem and how to handle it. We just did not know whom to believe. We couldn't understand how to go about treating his condition.

We found out that there were special schools for children with Autism and that they can learn if taught in a special manner. This was a life altering piece of information for us. We were very hopeful that this will be a positive turn in Shantanu's life. We moved to Thane. He was admitted to a special school there. He was given special education, acupressure and speech therapy. Slowly we could see some changes but there was still a long way to go. The therapies were ongoing but somewhere I felt that it did not bring about the change that I had expected. Years went by and Shantanu grew older. I knew he would probably never be completely 'normal'. We were prepared to accept him the way he was. But we were determined to help him get better, to the best of our ability. We chose to compromise with our lives. We had no hope from the special education that he was undergoing. We decided to discontinue the distressing special school and teach him in a loving and nurturing environment at home. I myself took up a course to become a special educator. I began to teach him at home and he appeared for school exams externally. Now, he was getting better.

We were still looking for newer treatments for him. My father, who is Shantanu's maternal grandfather, came across an article about Stem cell therapy in a daily newspaper. We, as a family

discussed about the potential of this treatment and decided to go ahead with it. We took an appointment to meet Dr. Alok Sharma at NeuroGen Brain and Spine Institute. He provided us with detailed information about this therapy and told us to be hopeful. He assured us that there would be no adverse effects and gave us confidence. He underwent Stem cell therapy after which his graph progressed upward, and much beyond our expectations. There was positive change in his behavior and speech. We slowly weaned him off his medicines. He started interacting with everyone at home, his hyperactivity reduced greatly and his understanding was getting better each day. He could read on his own, he was more attentive, could concentrate better and even his eye hand co-ordination improved. He cleared his 3rd and 5th standard (NIOS Board) by appearing for exams externally and is now appearing for the 8th standard. He is able to grasp difficult subjects like science. He plays with my younger daughter and even takes care of her. We are all very happy now and very hopeful that these changes in him will continue. We are very thankful to the doctors.

I thank God for blessing us with a meeting with Dr. Alok Sharma at the right time. Shantanu could not even fold a small handkerchief but he now folds everyone's blankets at home. He couldn't even brush on his own but now, he can. He even bathes himself. He would earlier randomly draw lines for pictures, now he draws and paints beautiful pictures. He was never bothered about the kind of clothes that were bought for him. Now he participates in choosing his own clothes. He enjoys wearing new clothes and admires the way he looks. His understanding of things happening around him has increased a lot. He understands everything we tell him or ask him to do. He does all the small chores at home like putting the clothes for laundry into the washing machine, setting the dinner table, setting the plates, cleaning the table. He even makes tea and 'maggi' noodles on his own. He can do all the housework like a normal individual. He takes care of his sister, goes to buy groceries and other items from shops. He is interested in listening to music now and his music collection seems to grow every day. He can converse in English, Hindi and Marathi (3 different languages). He has passed his 5th grade,8th grade and 10th grade in the last 4 years He is now pursuing higher studies. He is quite independent and we owe all of this to Dr. Sharma, who stepped into our lives as a savior. I'm very thankful to the Lord for all my family members who were very considerate and understanding. They have all helped us a lot. It is only because of these individuals that Shantanu has come so far. I would say that Stem cell therapy is a boon for children with Autism. When we had lost all hopes, Stem cell therapy showed us the light and filled our lives with happiness all over again.

- Mrs. Prachi Deo
(Mother of Master Shantanu Deo)

Resources

For more detailed information on autism and assessment tools refer **“Parent and Teacher Guidebook for Autism” (2nd Edition)** which can bee downloaded from **www.neurogenbsi.com**

D) MUSCULAR DYSTROPHY:

31. Alok Sharma; Hemangi Sane; Ritu Varghese; Amruta Paranjape; Samson Nivins; Sanket Inamdar;Nandini Gokulchandran; Prerna Badhe.Potential benefits of serial cell transplantation in a case of Duchenne Muscular Dystrophy. Open Journal of Clinical and Medical Case Report, Vol.4, Issue 4, 2018.
32. Alok Sharma, Nandini Gokulchandran, Amruta Paranjape, Hemangi Sane, Dr. Prerna Badhe. Stem cells as a therapeutic modality in Muscular Dystrophy. Chapter 2. Muscular Dystrophy. Avid Sciences. India. 2017
33. Alok Sharma, Amruta Paranjape, Hemangi Sane, Nandini Gokulchandran, Dhanashree Sawant, Shruti Shirke, Vivek Nair, Sanket Inamdar, Prerna Badhe. Effect of Cellular Therapy in a case of Limb Girdle Muscular Dystrophy. International Journal Of Current Medical And Pharmaceutical Research, Vol. 3, Issue, 09, pp.2377-2381, September, 2017
34. Alok S, Amruta P, Ritu V, Hemangi S, Nandini G, et al. Functional Improvements and Musculoskeletal Magnetic Resonance Imaging with Spectroscopy Changes following Cell Therapy in a Case of Limb Girdle Muscular Dystrophy. Int J cell Sci & mol biol. 2017; 2(4) : 555595.
35. Alok Sharma, Hemangi Sane, Vaibhav Lakhanpal, Amruta Paranjape, Pooja Kulkarni, Nandini Gokulchandran, Prerna Badhe. Stabilization of the disease progression in a case of Duchenne Muscular Dystrophy with cellular transplantation. Stem cell: Advanced research and therapy. 2017; 2017(3)
36. Alok Sharma , Dr. Prerna Badhe, Hemangi Sane, Suhasini Pai , Pooja Kulkarni, Khushboo Bhagwanani, Dr. Nandini Gokulchandran. Halting of functional decline in a case of Duchenne Muscular Dystrophy after cellular therapy. International Journal of Recent Advances in Multidisciplinary Research (IJRAMR), 2017 Jan
37. Sharma, A., Badhe, P., Sane, H., Gokulchandran, N., & Paranjape, A. Role of Stem Cell Therapy in Treatment of Muscular Dystrophy. Muscular dystrophy. SMGebooks. July 2016. Dover, USA.
38. Alok Sharma, Hemangi Sane, Jasbinder Kaur, Nandini Gokulchandran, Amruta Paranjape, Jayanti Yadav, Prerna Badhe Autologous Bone Marrow Mononuclear Cell Transplantation Improves Function in a Case of Becker's Muscular Dystrophy. American Based Research Journal. 2016; 5 (2)
39. Sharma A, Sane H, Gokulchandran N, Sharan, R., Paranjape, A., Kulkarni, P., Yadav J, Badhe, P. Effect of Cellular Therapy in Progression of Becker's Muscular Dystrophy: A Case Study. European Journal of Translational Myology. 2016;26(1):5522.

40. Sharma Alok, Sane Hemangi, Kulkarni Pooja, Mehta Dhara, Kaur Jasbinder, Gokulchandran Nandini, Bhagwanani Khushboo, Badhe Prerna. Effect Of Autologous Bone Marrow Mononuclear Cell Transplantation Coupled With Rehabilitation In Limb Girdle Muscular Dystrophy – A Case Report. Int J Med Res Health Sci. 2016, 5(12):1-7

41. Sharma A, Sane H, Gokulchandran N, Gandhi S, Bhovad P, Khopkar D, Paranjape A, Bhagwanani K, Badhe P. The role of cell therapy in modifying the course of limb girdle muscular dystrophy- A Longitudinal 5-year study. Degenerative Neurological and Neuromuscular Disease 2015:5 93–102

42. Alok Sharma, Hemangi Sane, Amruta Paranjape, Khushboo Bhagwanani, Nandini Gokulchandran, Prerna Badhe.Autologous bone marrow mononuclear cell transplantation in Duchenne muscular dystrophy – a case report. American journal of case reports 2014;15: 128-134.

43. Alok Sharma, Hemangi Sane, Prerna Badhe, Nandini Gokulchandran, Pooja Kulkarni, Mamta Lohiya, Hema Biju, V.C.Jacob. A Clinical Study Shows Safety and Efficacy of Autologous Bone Marrow Mononuclear Cell Therapy to Improve Quality Of Life in Muscular Dystrophy Patients. Cell Transplantation. 2013 Vol. 22, Supplement 1, pp. S127–S138.

44. Sharma A., Sane, H., Paranjape, A., Badhe, P., Gokulchandran, N., & Jacob, V. (2013). Effect of Cellular Therapy seen on Musculoskeletal Magnetic Resonance Imaging in a Case of Becker's Muscular Dystrophy.Journal of Case Reports, 3(2), 440-447.

45. Sharma, Alok et al. "Cellular Transplantation Alters the Disease Progression in Becker's Muscular Dystrophy." Case Reports in Transplantation 2013 (2013): 909328.

46. Dr. Suvarna Badhe, Ms. Pooja Kulkarni, Dr Guneet Chopra, Dr Nandini Gokulchandran, Dr Alok Sharma Dystrophin Deletion mutation pattern and Cardiac involvement in 46 cases of Dystrophinopathies. Asian journal of clinical cardiology. Asian Journal of Clinical Cardiology, Vol. 15, No. 6, October 2012: 211-214.

47. Dr. A. Sharma, Ms. P. Kulkarni, Dr. G. Chopra, Dr. N. Gokulchandran, Dr. M. Lohia, Dr. P. Badhe. Autologous Bone Marrow Derived Mononuclear Cell Transplantation In Duchenne Muscular Dystrophy-A Case Report. Indian journal of Clinical Practice 2012; 23 (3): 169-72.

48. Nandini Gokulchandran, Alok Sharma, Hemangi Sane, Amruta Paranjape,Ritu Varghese, Prerna Bhade. Autologous Bone Marrow Derived Mononuclear Cell Therapy in Muscular Dystrophy: A Review. Indian journal of Stem Cell Therapy; 2018; Vol 3(1): 40-55

E) SPINAL CORD INJURY:

49. Alok S, Prerna B, Suhasini, Hemangi S, Samson N, Pooja K, Amruta P, Dhara M, Nandini G.Functional Recovery and Functional Magnetic Resonance Imaging changes Following Cellular Therapy in a Case of Chronic Complete Spinal Cord Injury. Curr Trends Clin Med Imaging. 2017; 1(4): 555566.
50. Alok Sharma, Hemangi Sane, Suhasini Pai, Pooja Kulkarni, Amruta Paranjape, V C Jacob, Joji Joseph, Sanket Inamdar, Sarita Kalburgi, Nandini Gokulchandran, Prerna Badhe, Samson Nivins. Functional and symptomatic improvement after cellular therapy in a pediatric case of chronic traumatic incomplete SCI. J Stem Cell Regen Biol 2017; 3(1): 1-7.
51. Alok Sharma, Hemangi Sane, Dipti Khopkar, Nandini Gokulchandran,Varghese Chako Jacob, Joji Joseph, Prerna Badhe. Functional recovery in chronic stage of spinal cord injury by Neurorestorative Approach. Case Reports in Surgery 2014 Volume 2014, pages 1-4
52. Alok Sharma, Hemangi Sane, Dipti Khopkar, Nandini Gokulchandran, Hema Biju, V C Jacob, Prerna Badhe. Cellular therapy targeting Functional outcome in a case of Cervical Spinal Cord Injury. Advances in Stem Cells 2014 (2014)
53. Sharma A, Sane H, Gokulchandran N, Kulkarni P, Thomas N, et al. (2013) Role of Autologous Bone Marrow Mononuclear Cells in Chronic Cervical Spinal Cord Injury-A Longterm Follow Up Study. J Neurol Disord 1: 138.
54. Sharma A, Gokulchandran N, Sane H, Badhe P, Kulkarni P, Lohia M, Nagrajan A, Thomas N. Detailed analysis of the clinical effects of cell therapy for thoracolumbar spinal cord injury: an original study. Journal of Neurorestoratology. 2013; 1:13-22.
55. Alok Sharma, Prerna Badhe, Pooja Kulkarni, Nandini Gokulchandran, Guneet Chopra, Mamta Lohia, V.C.Jacob. Autologous Bone Marrow Derived mononuclear cells for the treatment of Spinal Cord Injury. The Journal of Orthopaedics. 2011; 1(1): 33-36.

F) STROKE:

56. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Pooja Kulkarni, Rishabh Sharan, Amruta Paranjape, Prerna Badhe Effect of Cellular Therapy Monitored on Positron Emission Tomography - Computer Tomography Scan in Chronic Hemorrhagic Stroke: A Case Report. Archiv Neurol Neurosurgery, 2016 Volume 1(1): 22-25
57. Alok Sharma, Hemangi Sane , Amruta Paranjape, Nandini Gokulchandran , Sushant Gandhi, Prerna Badhe. Benefits of Autologous Bone Marrow Mononuclear Cell Transplantation in Chronic Ischemic Pontine Infarct. Journal Of Case Reports 2016;6(1):80-85

58. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Dipti Khopkar, Amruta Paranjape, Jyothi Sundaram, Sushant Gandhi, and Prerna Badhe. Autologous Bone Marrow Mononuclear Cells Intrathecal Transplantation in Chronic Stroke Stroke Research and Treatment, Volume 2014, pages 1-9.

59. Alok Sharma, Hemangi Sane, Anjana Nagrajan, et al., "Autologous Bone Marrow Mononuclear Cells in Ischemic Cerebrovascular Accident Paves Way for Neurorestoration: A Case Report," Case Reports in Medicine, vol. 2014, Article ID 530239, 5 pages, 2014. doi:10.1155/2014/530239.

60. Dr. Alok Sharma, Dr. Hemangi Sane, Dr. Prerna Badhe, Ms. Pooja Kulkarni, Dr. Guneet Chopra, Dr. Mamta Lohia, Dr. Nandini Gokulchandran. Autologous Bone Marrow Stem Cell Therapy shows functional improvement in hemorrhagic stroke- a case study. Indian Journal of Clinical Practice, 2012:23(2):100-105.

G) ALS/MND:

61. Alok Sharma, Hemangi Sane, Sarita Kaliburgi, Amruta Paranjape, Nandini gokulchandran, Prerna Badhe,"Potential Benefits of Cellular Transplantation in a Patient with Amyotrophic Lateral Sclerosis". Current Opinions in Neurological Science 1.2 (2017): 31-43

62. Sharma A, Sane H, Sawant D, Paranjape A, Inamdar S, Kaur J, Gokulchandran N, Badhe P. Cellular Therapy in Amyotrophic Lateral Sclerosis: A Case Report; International Journal of Recent Advances in Multidisciplinary Research. 2017;1(4):2605-2609

63. Hemangi Sane, Alok Sharma, Nandini Gokulchandran, Sarita Kalburgi, Amruta Paranjape, Prerna Badhe Neurorestoration in Amyotrophic Lateral Sclerosis - A case report. Indian Journal of Stem Cell therapy. 2016; 2(1):29-37

64. Alok K Sharma , Hemangi M Sane , Amruta A Paranjape , Nandini Gokulchandran , Anjana Nagrajan , Myola D'sa , Prerna B Badhe. The effect of autologous bone marrow mononuclear cell transplantation on the survival duration in Amyotrophic Lateral Sclerosis - a retrospective controlled study. Am J Stem Cells 2015;4(1).

65. Alok Sharma, Prerna Badhe, Omshree Shetty, Pooja Vijaygopal, Nandini Gokulchandran, V.C. Jacob, Mamta Lohia, Hema Biju, Guneet Chopra. Autologous bone marrow derived stem cells for motor neuron disease with anterior horn cell involvement. Bombay hospital journal. 2011; 53(1): 71-75.

H) MISCELLANEOUS:

66. Efficacy of Autologous Bone Marrow Derived Mononuclear Cells in the treatment of neurodeficits in Down's Syndrome: A case report. British Journal of BioMedical Research. 2018. (In Press)

67. Alok Sharma, Nandini Gokulchandran,Hemangi Sane,Suhasini Pai , Pooja Kulkarni, Khushboo Bhagwanani, Nayana Shet, Mr. Samson Nivins, Prerna Badhe. Functional improvements monitored by Positron Emission Tomography imaging after cell transplantations in severe chronic Traumatic Brain Injury. International Journal of Surgery and Medicine. March 2018

68. Dr. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Mrs. Suhasini Pai, Pooja Kulkarni, Jayanti Yadav, Sanket Inamdar. Cellular Therapy for Chronic Traumatic Brachial Plexus Injury-A case report. Advanced Biomedical Research journal. 2018;7:51

69. Alok Sharma, Hemangi Sane, Nandini Gokulchandran, Prerna Badhe, Pooja Kulkarni, Suhasini Pai, Ritu Varghese, Amruta Paranjape. Stem cell therapy in pediatric neurological disabilities In Physical disabilities. Intech 2017

70. Alok Sharma, Hemangi Sane , Sarita Kalburgi , Pooja Kulkarni , Sanket Inamdar, Khushboo Bhagwanani ,Nandini Gokulchandran , Prerna Badhe. Autologous Bone Marrow Mononuclear Cell Transplantation for Multiple System Atrophy type C- A Case Report. American Based Research Journal. 2016.

71. Alok Sharma Hemangi Sane Pooja Kulkarni Nandini Gokulchandran Dhanashree Sawant Samson Nivins Prerna Badhe. Effect of Cell Transplantation in a Chronic Case of Traumatic Brain Injury. Transplantation Open. 2016 Volume 1(1): 22-25

72. Alok Sharma, Ziad M Al Zoubi. Rethinking on ethics and regulations in cell therapy as part of neurorestoratology. Journal of Neurorestoratology 2016:4 1–14

73. Alok Sharma, Hemangi Sane, Pooja Kulkarni, Nandini Gokulchandran, Prerna Badhe Cellular therapy in Neurodevelopmental disorders. Indian Journal of Stem Cell therapy. 2016; 2(1):64-73

74. Alok Sharma, Nandini Gokulchandran, Hemangi Sane, Prerna Badhe, Amruta Paranjape. Current global trends in regulations for stem cell therapy and the way ahead for India. Indian Journal of Stem Cell therapy. 2016; 2(1):5-16

75. Nandini Gokulchandran, Alok Sharma , Hemangi Sane , Prerna Badhe , Pooja Kulkarni. Stem Cell Therapy as a Treatment Modality for Neurotrauma. Indian Journal of Stem Cell therapy. 2015; 1(1):21-26.

76. Dr. Alok K. Sharma, Dr. Hemangi Sane , Dr. Nandini Gokulchandran , Dr. Amruta Paranjape , Ms. Pooja Kulkarni , Dr. Prerna Badhe. The need to review the existing guidelines and proposed regulations for stem cell therapy in India based on published scientific facts, patient requirements, national priorities and global trends. Indian Journal of Stem Cell therapy. 2015; 1(1):7-20.

77. Alok Sharma, Prerna Badhe, Nandini Gokulchandran, Pooja Kulkarni, Hemangi Sane, Mamta Lohia, Vineet Avhad. Autologous bone marrow derived mononuclear cell therapy for vascular dementia - Case report. Journal of stem cell research and therapy. J Stem Cell Res Ther 2:129.

78. Alok Sharma, Hemangi Sane, Pooja Kulkarni, Jayanti Yadav, Nandini Gokulchandran, Hema Biju, Prerna Badhe. Cell therapy attempted as a novel approach for chronic traumatic brain injury - a pilot study. SpringerPlus (2015) 4:26.

79. Sharma A, Sane H, Paranjape A, Gokulchandran N, Takle M, et al. (2014) Seizures as an Adverse Event of Cellular Therapy in Pediatric Neurological Disorders and its Prevention. J Neurol Disord 2:164.

80. Alok Sharma, Hemangi Sane, Amruta Paranjape, Nandini Gokulchandran, Hema Biju, Myola D'sa, Prerna Badhe. Cellular Transplantation May Modulate Disease Progression In Spino-Cerebellar Ataxia – A Case Report. Indian Journal Of Medical Research And Pharmaceutical Sciences. August 2014; 1(3).

81. Alok Sharma, Nandini Gokulchandran, Guneet Chopra, Pooja Kulkarni, Mamta Lohia, Prerna Badhe, V.C. Jacob. Administration of autologous bone marrow derived mononuclear cells in children with incurable neurological disorders and injury is safe and improves their quality of life. Cell Transplantation, 2012; 21 Supp 1: S1 – S12.

82. A. Sharma, P. Badhe, N. Gokulchandran, P. Kulkarni, V.C Jacob, M. Lohia, J. George Joseph, H. Biju, G. Chopra. Administration of Autologous bone marrow stem cells intrathecally in Multiple Sclerosis patients is safe and improves their quality of life. Indian Journal of clinical Practice. 2011:21(11):622-625.

83. Sharma A, Gokulchandran N, Kulkarni P, Chopra G. Application of autologous bone marrow stem cells in giant axonal neuropathy. Indian J Med Sci 2010;64:41-4.

84. A Sharma, P Kulkarni, N Gokulchandran, P Badhe, VC Jacob, M Lohia, J George Joseph, H Biju, G Chopra. Adult Stem Cells for Spinal Muscular Atrophy. Bangladesh Journal Of Neuroscience. 2009; 25(2): 104- 107.

85. Alok sharma, Hemangi Sane, Nandini Gokulchandran, Amruta Paranjape, Pooja Kulkarni, Prerna Badhe. Recent development in ethical understanding and regulations for clinical application of stem cells.Indian journal of Stem Cell Therapy; 2018; Vol 3(1): 5-20.

86. Samson Nivins, Pooja Kulkarni, Suvarna Badhe, Hemangi Sane, Nandini Gokulchandran, Alok Sharma.Disease progression in early onset Alzheimer's Dementia over a period of 1 year using 18F-FDG-PET – A Case based approach.EC Neurology (In press)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A separate pediatric neurorehabilitation facility and other play areas makes it very child friendly. The institute is very scientific and academic in its approach and to date has published 81 scientific papers in international and national journals. 14 books have also been published and chapters contributed to several international textbooks. NeuroGen also has many international tie ups with leading organizations from America and other countries for research and treatment collaborations. The institute is very quality conscious and has several certifications (1. ISO 9001:2015, 2. GLP & 3. GMP certification). Despite all the international partnerships and treatments offered to patients from all over the world the institute is very socially conscious and through the Stemcare foundation financially supports patients from the lower socioeconomic strata to be able to avail of the treatments that are needed. Its a policy of the institute that no patient should be deprived of any treatment due to financial reasons. NeuroGen doctors conduct free medical camps all over the country. Conferences, workshops and CME's are regularly conducted to impart knowledge to doctors, therapists as well as patient families. Cutting edge research, pioneering new treatments, the best medical professionals, comprehensive treatment facilities all under one roof and a caring holistic approach and make the NeuroGen Brain and Spine institute a unique and special facility for patients with Neurological problems.

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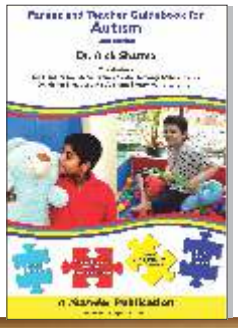

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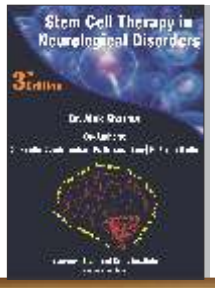

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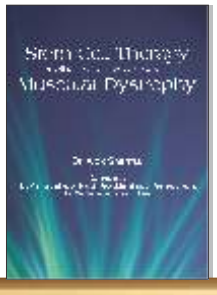

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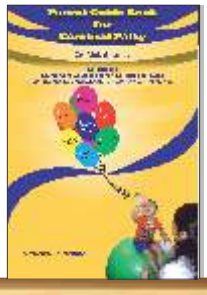

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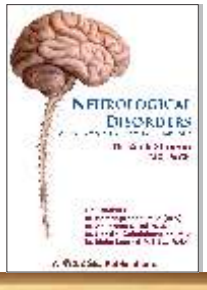

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