Autism – neurocognitive disorder

Neurocognitive Disorder Research: Autism Psychology November, 09, 2010 " Autism is a lifelong developmental disability. It is part of the autism spectrum and is sometimes referred to as an autism spectrum disorder, or an ASD. The word 'spectrum' is used because, while all people with autism share three main areas of difficulty, their condition will affect them in very different ways. Some are able to live relatively 'everyday' lives; others will require a lifetime of specialist support (Hesmondhalgh, 2010).

This thesis intends to investigate this behavioural disorder through its mechanisms of pathophysiology of brain structures and processes associated with autism, and the neuropsychological linkages between brain structures and behaviours also treatment for the disease through behavioural and cognitive approaches. In contrast to Neurodegenerative diseases such as Alzheimer’s diseases, autism lacks any clear unifying pathology at the molecular, cellular, or systems level (Geschwind, 2008).

Autism appears to result from developmental factors that affect many or all functional brain systems. “ Several recent functional neuro-imaging studies provide evidence of a lower degree of coordination among activated brain areas in autism. Recent studies found that the brain activity was less synchronized across activated brain areas (i. e. , there was reduced functional connectivity) in autism” (Just, Cherkassy, Keller, & Minshew, 2007) Neuroanatomical studies suggest that autism's mechanism includes alteration of brain development soon after conception.

Just after birth, the brains of autistic children tend to grow faster than usual, followed by normal or relatively slower growth in childhood. It is not known

whether the early overgrowth take place in all autistic children. It seems to be most prominent in brain areas underlying the development of higher cognitive specialization (Just et al. , 2007). Suggestions for the bases of pathological early overgrowth include; an excess of neurons that causes local over connectivity in key brain regions and abnormal formation of synapses and dendritic spines Courchesne, Pierce, Shumann, Redcay, Buckwalter, Kennedy& Morgan, 2007). Interactions between the immune system and the nervous system begin early during the embryonic stage of life, and successful neurodevelopment depends on a balanced immune response. It is possible that abnormal immune activity during critical periods of neurodevelopment is part of the mechanism of some forms of Autism (Ashwood, Wills, Van de Wood, 2006). Five MRI studies of individuals with autism at a wide range of ages have found the cerebellum to be enlarged compared to individuals without the disease (Amaral, Schumann, & Nordahl, 2008).

Evidence has been found in functional neuroimaging studies on autistic individuals and by a brainwave study that suggested that adults with Autism have local over connectivity in the cortex and weak functional connections between the frontal lobe and the rest of the cortex. Other evidence suggests the under connectivity is mainly within each hemisphere of the cortex and that autism is a disorder of the association cortex . The amygdala in autism patients also show a difference compared to normal individuals.

The amygdala in boys with autism appears to undergo an abnormal developmental time that includes a period of enlargement that persists through late childhood (Amaral et al. , 2008). Other brain regions show

affects of autism. There is also evidence, although somewhat inconsistent , for abnormalities within the hippocampus, both in volume and more recently in shape 68 S. R. Dager et al. , Shape mapping of the hippocampus in young children with autism spectrum disorder, AJNR Am. J. Neuroradiol. 28 (2007), pp. 672–677. View Record in Scopus | Cited By in Scopus (11).

In post-mortem studies, showed increased cell packing density and smaller neurons in the hippocampus in all autism cases examined (Amaral et al. , 2008). These abnormal brain structures mentioned above contribute to the abnormal behaviours in autism. The core features of autism are qualitatively impaired socialization; impaired verbal and nonverbal communication; and restricted and repetitive patterns of behaviour, interests, and activities. (Grossberg,& Seidman, 2006). Much like a computer, the brain relies on complicated wiring to process and transmit information.

Scientists have discovered that in people with autism, this wiring is faulty, leading to misfiring in communications between brain cells. In the brain, nerve cells transmit important messages that regulate body functions everything from social behaviour to movement. Imaging studies have revealed that autistic children have too many nerve fibres, but that they're not working well enough to facilitate communication between the various parts of the brain. Scientists think that all of this extra circuitry may affect brain size.

Although autistic children are born with normal or smaller-than-normal brains, they undergo a period of rapid growth between ages 6 and 14 months, so that by about age four, their brain tends to be unusually large for

their age. Genetic defects in brain growth factors may lead to this abnormal brain development. Scientists also have discovered irregularities in the brain structures themselves, such as in the corpus callosum (which facilitates communication between the two hemispheres of the brain), amygdala (which affects emotion and social behavior), and cerebellum (which is involved with motor activity, balance, and coordination).

They believe these abnormalities occur during prenatal development. In addition, scientists have noted imbalances in neurotransmitters -- chemicals that help nerve cells communicate with one another. Two of the neurotransmitters that appear to be affected are serotonin (which affects emotion and behaviour) and glutamate (which plays a role in neuron activity). Together, these brain differences may account for autistic behaviors. Early in development, infants preferentially focus their attention on human faces and voices; particularly the face and voice of their mother, while infants with Autism do not show this preference. Dictenberg , & Lewis, 2010) states that “ The fusiform “ face area” and the amygdala, a key brain region involved with emotion, exhibit reduced responses in children with Autism. ” Cases with Autism seemingly exhibit the following; social impairments such as lack of properly use of nonverbal behaviours such as gestures and facial expressions, failing to develop age-appropriate peer relationships, not being able to spontaneously share objects or interests with others and lack of social or emotional reciprocity. Walsh, Morrow, & Rubenstein, 2008) Autism cases also show communication impairments such as speech, difficulty sustaining conversations, repeated use of the same language and has difficulty sustaining a conversation (Grossberg et al. ,

2006). Restricted and repetitive patterns of behaviour such as being intensely preoccupied with one or more interests inflexible and unwilling to change set routines, repeats motions or mannerisms (such as waving arms, flapping, or twisting) preoccupied with parts of objects are just some of the behaviours that may be associated with autism (Grossberg et al. , 2006).

Extreme unevenness in cognitive skills is a common feature of autism. Some autistic individuals have “ islands” of normal or, occasionally, even superior ability, and a few have narrow skill sets that are so superior to normal populations that such individuals are referred to as savants. These areas of higher ability often include mathematical and musical skills. Autistic individuals also have facilitated skills at detecting hidden, embedded figures and at copying “ impossible figures” (Grossberg et al. , 2006). There is no cure for autism, but with treatment, people with the condition can live fuller lives.

Behavioural therapy (also called behavioural intervention) is the most commonly used treatment. Teachers, parents, and counsellors work together to help the child improve his or her communication, physical, and social skills (Patterson, Smith, & Jelen 2010). One of the most popular behavioural therapies is called Treatment and Education of Autistic and Communication Handicapped Children better known as (TEACCH), which was developed in the 1970s. This method helps, parents and professionals (teachers, therapists, etc.) work closely together to improve the child's adaptive skills through structured cognitive and behavioural therapy.

The program is individualized to the child, and takes place in several environments-from clinics to classrooms. Other educational programs include the teaching of positive behaviours through art, academics and physical education; others, which helps improve children's communication, attention and cognitive skills. Autistic individuals also may need occupational therapy; to learn everyday tasks, sensory integration therapy; to help process stimuli, physical therapy; to improve motor skills, and speech therapy. Treatment should be tailored to the individual child because not all autistic cases are identical (Levy, Mandell, & Schultz, 2009).

Socialisation deficits can be dealt with individually or in small group settings. Behavioural strategies and skills training can teach social skills, enhance peer interaction, and promote play skills, because communication deficits are central to autism spectrum disorders, speech and language therapy is very important. In young non-verbal children, strategies include use of principles of positive reinforcement to promote attention and imitation. For children with verbal apraxia, augmentative strategies such as the picture exchange communication system might improve communication and improve behavioural difficulties. (Levy et al. 2009). Although they can't treat autism specifically, medications can help manage the symptoms of autism. Most drugs prescribed for autism are used off-label, which means they are not approved specifically for autism, but they have been approved to treat the same symptoms in other conditions. Researchers have found that people with autism have a higher-than-normal level of the neurotransmitter serotonin. Drugs called selective serotonin reuptake inhibitors (SSRIs) better known as antidepressants, which include Prozac and Zoloft, help regulate

serotonin levels and control anxiety, depression and obsessive-compulsive behaviours.

There is concern that these drugs may be associated with suicidal thoughts and behaviours in children, however; so they are used with caution. (Levy et al. , 2009). Data from the Research Units on Paediatric Psychopharmacology autism network provided support for the use of antipsychotic drugs for aggression and other severe behavioural problems associated with autism. Antipsychotic medications work by reducing the amount of the neurotransmitter, dopamine, in the brain. The older antipsychotic medications such as Haldol may be effective for autism, but they can have side effects, including sedation and unusual movements (called dyskinesias).

A fairly newer antipsychotic medication used for autism is the drug called, Risperdal, which is used for irritability in autistic children and adolescents ages 5 to 16. It is the first drug to be approved specifically for autism-related behaviours, such as aggression, hostility, self-injury, and agitation, and it tends to have fewer side effects than the older antipsychotics (Levy et al. , 2009). Treatments should be prioritised by risks, dysfunction, and effect autistic individual; for example, a child with maladaptive behaviour in one situation might have an improved response to a behavioural plan after a functional behavioural analysis.

Such an analysis would identify triggering events and consequences that might perpetuate undesired behaviour. Behaviours that are severe or arise in many settings, or both, and are not adequately treated with behavioural strategies alone might be helped by a combination of behavioural and drug

treatment (Just et al. , 2007). Complementary and alternative medical treatments are often used by families. Their popularity is in part attributable to the ever-present of symptoms of autism and the absence of effective medical treatments (Levy et al. , 2009).

Music has been used as an alternative treatment for autism for a long time because of the beneficial effects of music stimuli and the positive musical responses in children with autism. The use of music has been utilized for development in various areas such as: motor coordination, attention span, social interpersonal skills, concept self and verbal and non verbal communication. In particular the use of music was a very effective in the increase of communicative behaviours including vocalizing and verbalization, gestures, and vocabulary comprehension (Lim, 2010).

Creating a behavioural program with activities geared towards relieving symptoms in Autistic individual can be achieved with the different therapies mentioned but can only be used in various ways because autistic individual are very different from one another when it comes to the effect of the disease on the individual. In conclusion autism varies widely in severity and symptoms and may go unrecognized, especially in mildly affected children or when it is masked by more debilitating handicaps.

Scientists aren’t certain about what causes autism, but studies of people with autism have found to have irregularities in several regions of the brain (Sussman, 2008). Other studies suggest that people with ASD have abnormal levels of serotonin or other neurotransmitters in the brain. These abnormalities suggest that autism could result from the disruption of normal

brain development early in fetal development caused by defects in genes that control brain growth and that regulate how brain cells communicate with each other, possibly due to the influence of environmental factors on gene function.

While there is no cure for autism the use of Therapies and behavioural interventions are designed to remedy specific symptoms and can bring about substantial improvement. The ideal treatment plan coordinates therapies and interventions that meet the specific needs of individual children. Most health care professionals agree that the earlier the intervention, the better. (Hesmondhalgh, 2010) References Amaral, D. G. , Shummann, C. M. , & Nordahl, C. W. (2008). Neuroanatomy of autism. Trends in Neuroscience. 31(3), 137-145. doi: 10. 1016/j. tins. 2007. 12. 005 Ashwood, P. Wills, S. , Van de Water, J. (2006). The immune response in autism: a new frontier for autism research. Leukocyte Biology. 80(1), 1–15. doi: 10. 1189/jlb. 1205707 Courchesne, E. , Pierce, K. , Schumann, C. M. et al. (2007). Mapping early brain development in autism. Neuron. 56(2), 399–413. doi: 10. 1016/j. neuron. 2007. 10. 016. Geschwind D. H. (2008). Autism: many genes, common pathways? Cell. 135(3), 391–5. doi: 10. 1016/j. cell. 2008. 10. 016 Grossberg, S. , Seidman, D. (2006). Neural dynamics of autistic behaviors: cognitive, emotional, and timing substrates. Psychological Review. 13(3), 485-525. Hesmondhalgh, M. (2010). Autism at work. Occupational Health. 62(2), 32-34. Retrieved from Academic Search Premier database. Just, M. A. , Cherkassy, L. V. , Keller, T. A. , Kana, R. K. , & Minshew, N. J. (2007). Functional and anatomical cortical underconnectivity in autism: Evidence from an fMRI study of an executive function task and

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