

Introduction: Neurodevelopmental Disorders

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In this issue, I'm glad to introduce neurodevelopmental disorders. The neurodevelopmental disorders are 'a group of conditions with onset in the developmental period', which are firstly introduced in American Psychiatric Association's fifth edition of Diagnostic and Statistical Manual of Mental Disorders (DSM-5, APA, 2013) [1]. The disorders typically occur in early development and are characterized by developmental deficits that produce impairments of personal, social, academic, or occupational functioning. The deficits of disorders are widely ranged from very specific limitations of learning or communicative skills to global impairments of social interactions or intellectual function. Under the category of the neurodevelopmental disorders, as you know, six diagnostic entities are there.

Intellectual disability (intellectual developmental disorder, formerly mental retardation) is characterized by deficits in general mental abilities, such as reasoning, problem solving, planning, abstract thinking, judgement, academic learning, and learning from experience, and also in adaptive functioning in comparison to an individual's age-, gender-, and socioculturally matched peers. Recently the term 'mental retardation' is replaced with the term 'intellectual disability' by forensic, educational, and other professionals and public and advocacy groups.

The communication disorders include language disorder, speech sound disorder, social (pragmatic) communication disorder, and childhood-onset fluency disorder (stuttering). The first three disorder are characterized by deficits in the development and use of language, speech, and social communication, respectively. Speech is the expressive production of sounds and includes an individual's

articulation, fluency, voice, and resonance quality. Language includes the form, function, and use of a conventional system of symbols (i.e., spoken words, sign language, written words, pictures) in a rule-governed manner for communication. Communication includes any verbal or nonverbal behavior that influences the behavior, ideas, or attitudes of another individual. The core features of language disorder are persistent difficulties in the acquisition and use of language across modalities (i.e., spoken, written, sign language, or other) due to deficits in comprehension or production. Speech sound disorder is characterized by persistent difficulty with speech sound production. Childhood-onset fluency disorder (stuttering) is characterized by disturbances of normal fluency and time patterning of speech, including sound and syllable repetitions, sound prolongation of consonants as well as vowels, broken words, audible or silent blocking, circumlocutions, words produced with an excess of physical tension. Social (pragmatic) communication disorder is a new category in DSM-5, which is characterized by a primary difficulty with language pragmatics, or the social use of language and communication, as manifested by deficits in understanding and following social rules of verbal and nonverbal communication, changing language to match context or the needs of listener and following rules for conversation and storytelling.

Autism spectrum disorder (ASD) is a new category in DSM-5, which replaces pervasive developmental disorders (PDDs) in DSM-IV. DSM-5 introduced the concept of spectrum derived from dimensionality. On the understanding that previously separate three disorders listed under the PDD rubric in DSM-IV are better con-

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ceptualized as different levels of severity of one single condition, ASD includes the former autistic disorder, Asperger's syndrome, and PDD not otherwise specified (NOS). Rett's syndrome and childhood disintegrative disorder have been removed from this category. The new definition of ASD is derived from conceptualization which previous distinctions between these disorders were artificial clustering of different levels of severity of the same disorder as a continuum. And based on the view that 'social deficits' and 'communication deficits' in the former DSM-IV are manifestations of a single set of symptoms, the social communication and interaction deficits domain was merged to one domain [2]. So, diagnostic criteria for ASDs were changed from three to symptom domain: 1) Deficits in social communication and social interaction, and 2) Restrictive repetitive behavior, interests and activities.

Specific learning disorder is diagnosed when there are specific deficits in an individual's learning and academic skills to perceive or process information efficiently and accurately. Important changes in DSM-5 have been made in the diagnostic manifestations of this disorder including merging the four previous subtypes in DSM-IV into one single category and consequent changes in diagnostic criteria.

Attention-deficit/hyperactivity disorder (ADHD) is defined by a persistent pattern of attention and/or hyperactivity-impulsivity that interferes with functioning or development as a neurodevelopmental disorder. There have not been major changes to the diagnostic construct, which 18 core symptoms remain the same. The minor changes in DSM-5 include age of onset from 7 to 12 years of age, lowering the symptom threshold for older adolescents and adults from 6 to 5, changing subtypes to current presentation, the removal of ASD from the exclusion criteria, and presenting examples of diagnostic symptoms for different developmental stages.

Finally, three previous separate disorders listed in DSM-IV are merged one umbrella category 'motor disorders.' The motor disorders include developmental coordination disorder, stereotypic movement disorder, and tic disorders. Developmental coordination disorder is characterized by deficits in the acquisition and execution of coordinated motor skills, and manifested as clumsiness (e.g., dropping or bumping into objects) as well as slowness and inaccuracy of performance of motor skills (e.g., catching an object, using scissor or cutlery, handwriting, riding a bike, or participating in sports). Stereotypic movement disorder is defined by repetitive, seemingly driven, and apparently purposeless motor behavior, such as hand shaking or waving, body rocking, head banging,

self-biting, hitting own body. Tic disorders comprise four diagnostic categories: Tourette's disorder, persistent (chronic) motor or vocal tic disorder, provisional tic disorder, and the other specified and unspecified tic disorders. Tic disorders are characterized by presence of motor or vocal tics, which are sudden, rapid, nonrhythmic motor movement or vocalization. Specific tic disorder is diagnosed on the basis of the presence of tics, duration of tic symptoms, age at onset, and absence of any known cause.

In this issue, we will discuss three neurodevelopmental disorder: ASD, Attention-deficit/hyperactivity disorder, and motor disorders. In addition, our discussion includes cerebral palsy and prematurity. Especially we focus ASD because the prevalence has tended to increase over the last few decade from 4-10/10,000 in 1990s to 1 in 68 based on a recent report [3]. And ASD is 'hot' topic in public domain as well as scientific research. To improve service systems for individuals with developmental disabilities, 'Developmental Disabilities Assistance and Bill of Rights Act' enacted by Congress Assembled of Korea on 19 November 2014. Based on the act, Secretary of Ministry of Health and Social Welfare should establish the research and medical support system for the cause, treatment, and remediation of problem behaviors in persons with developmental disabilities [4].

First five papers reviewed ASD. Dr. Yoo reviewed the early risk signs of ASD in infancy and toddler period, and discussed early intervention and its implications [5]. Prof. Rhou discussed the thinking style of person with Asperger's syndrome, and introduced a new intervention for them in the social model rather than traditional medical deficits model [6]. Dr. Bahn and his colleagues reviewed brain stimulation and modulation as emerging treatment option for person with ASD: electroconvulsive therapy (ECT) for catatonia in ASD, vagal nerve stimulation (VSN) for comorbid epilepsy and ASD, deep brain stimulation (DBS) for serious self-injurious behavior [7]. Dr. Ahn and Cho reviewed socially assistive robotics (SAR), which referred to a robot that provides assistance to the user in a social interaction setting, and discussed the role of SARs in the treatment program of children with ASD including recent research in Korea [8]. Prof. Kim reviewed therapeutic approaches to ASD, especially focused to the psychosocial treatment for person with ASD [9].

Dr. Ahn and Min's paper discussed the lifespan course of ADHD as a neurodevelopmental disorder. They focused preschool and adolescent period as well as childhood and adulthood period [10]. Dr. Park and Park reviewed motor disorders: tic disorder, motor

coordination disorder, and stereotypic movement disorder. They indicated the shortage of our understanding and knowledge about the pathogenesis and the management of the disorders [11]. Dr. Kim reviewed the current researches expanding therapeutic options to improve the posture and movement control in children with cerebral palsy. She listed and discussed several interventions: rehabilitation interventions (e.g., early intervention, neurodevelopmental treatment, progressive resistance exercise, gross motor task training, hippotherapy and/or hippotherapy stimulation, reactive balance training, Treadmill training, functional electrical stimulation, trunk-target training, visual biofeedback, virtual reality, robot-assisted and computer-enhanced therapy, constraint-induced movement therapy, hand-arm intensive bimanual therapy); medical interventions (e.g., botox injection, stem cell-based intervention [12]. Dr. Lee and Park discussed the impact and consequences of preterm birth and/or very low birthweight (VLBW) without major disabilities on postnatal brain development throughout childhood focusing on cognition and language [13]. Finally, Dr. Oh reviewed psychological assessment for children with neurodevelopmental disorders, focusing on intellectual functioning, neuropsychological and autism diagnostic assessment [14].

This issue did not cover all neurodevelopmental disorders in DSM-5, but include the cerebral palsy and prematurity. During past two years, we try to establish Hanyang Developmental Medicine Research Center (HYDMRC) as well as the clinics of medical center. This work is one of our efforts for the establishment of HYDMRC.

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