**Importance of Advanced Studies in Early Stages of Human Life:**

**A Neurodevelopmental Perspective from Nu-lab**

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There have been wide discussions among scientists during the last few decades on how human babies are affected by birth conditions, what are the best ways to investigate and predict neurobehavioral and neurodevelopmental trends of newborns, how babies learn about themselves and the world, whether it is possible to detect abnormalities such as neurological deficits as earliest as possible for early intervention purposes, and how to boost babies’ brain and their body functions interactively from day one of life. To answer these questions, I would like to grab your attention to the ongoing scientific activities and findings in our multidisciplinary laboratory at the Norwegian University of Science and Technology (NTNU).

Global studies and particularly the results from our Developmental Neuroscience Laboratory (Nu-Lab) at NTNU highlight the importance of structured studies to capture and lighten the differences between babies’ brains particularly during the first 2 years of life, and how early detection and consequently early stimulation would greatly influence newborn babies’ life. The main focus of studies at Nu-Lab is to understand the neurodevelopment of vision and sensorimotor coordination throughout lifespan. Therefore, newborn babies and participants of later ages have been widely investigated by the advanced scientists who utilize well developed methods and technologies such as electroencephalography (EEG), eye-tracking, neuropsychological battery, and human machine intelligence. These are used to determine the function of visual perception, attention, sensorimotor coordination, motor skills, and their development in babies, focusing on both early and later years of life in general during last 30 years.

Scientific findings from such an advanced and supervised laboratory by Prof. Audrey van der Meer and Prof. Ruud van der Weel and us as research associates address different research questions related to neuropsychological (dys)functions in early stages of life to prevent and facilitate development through lifespan. These studies are very essential for designing any program for healthy neuro-psycho-physiological development especially why and how some babies develop problems. To achieve these goals, scientists in Nu-lab study human neurodevelopment using different types of studies and research paradigms e.g., neuro-behavioral changes during first year of life in new born babies, comparing preterm, near term and full term born babies at the earliest stages of life toward adulthood as a longitudinal study investigating at different ages.

Such studies enable us, as scientists, to understand how babies and toddlers develop, and simultaneously help us to facilitate, enrich and optimize our neurodevelopmental programs to offer training packages, tips and techniques to different target groups e.g., parents, educators, clinicians and other groups of professionals.

**Why Nu-Lab researchers interested to study preterm and near term born babies?**

Epidemiological studies reported that approximately, on average, 9-12% of children were born preterm globally, 25% of which have low weight and some kind of visual impairment (approximately 2% of them are blind). Being born preterm is one of the main causes of death during the first 5 years of life and, in case of survival, children will be at great risk of short- and long-term morbidities which cannot be necessarily improved by different means of rehabilitations and therapeutic approaches. More importantly, due to lack of adequate healthcare in low- and middle-income countries, preterm babies die or face a lot of personal and health challenges as they don’t get enough attention, treatment and rehabilitation programs in their home countries. To blame is not only the lack of facilities and medical equipment but also the limited knowledge about brain, body, life issues and particularly neurodevelopmental related aspects and underlying mechanisms throughout life span. As we know, these play key roles in one’s daily life e.g., in speech, balance and walking, sensorimotor skills, social skills and interaction with the environment. Crucially, learning is also one of the prerequisites for a good life quality and well-being. Not only preterm borns which is one of our main target groups at Nu-Lab, but also full term borns can be affected by birth, environmental or internal stressors, family issues, infections, and many other risk factors.

Lack of consideration of these aspects can increase the rate of mortality for both preterm born children/adolescents or adults, or indirectly other people living alongside them in the societies for a longer period of time. For example, being preterm born is itself leading to high rates of seizure, cerebral palsy, visual and hearing problems etc., and also increases the vulnerability of life-time disorders, especially the risk of being diagnosed with autism spectrum disorder and attention deficit hyperactivity disorder. From both neuro- and psycho-physiological perspectives, the first 5-6 years of life are very crucial, with unimaginably valuable experiences. Thus, this period of life and these differences received the highest level of attention from neurodevelopmental scientists and especially by our lab experts as every other aspects of human beings such as personality, bio-psycho-socio-spiritual, cognitive and emotions are actually formed.

My next article will focus on the importance of early stimulation programs and how Nu-lab studies contributed to the development of such programs.