THE LEARNING LEAD
Breakthrough nutrition and development news, now
Wyeth Nutrition SCIENCE CENTER
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The Effect of Myelin-Relevant Nutrients on Brain Myelination and Cognitive Development

The association between brain development and nutrition has been gaining attention due to emerging evidence on the detrimental effect of nutritional deficiencies on cognitive functioning in infants. Brain development begins with the formation of brain cells, followed by cell migration and the development of a complex network of connections between neurons to ensure information processing in the brain. As part of the process, neuronal axons get coated with a lipid-rich sheath, a process called myelination and an important hallmark of neurodevelopment (**Figure 1**).[1]

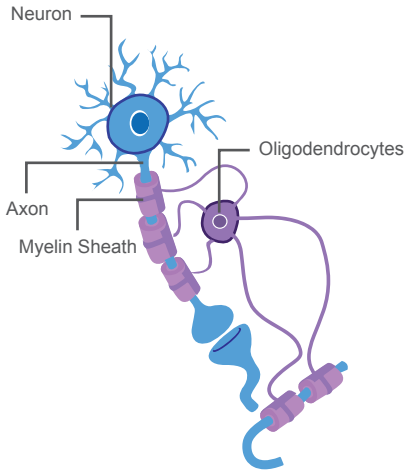

Figure 1: Neuronal axons get coated with a lipid-rich sheath.

Beginning in utero and continuing into the second and third decades of life, the protracted nature of myelination imparts a high degree of plasticity to developing neural systems and closely conforms to emerging neurobehavioral abilities. Alterations in myelination timing and/or extent can therefore significantly affect behavioural and cognitive outcomes.[2,3]

Nutrition may be one of the biggest modifiable early life influencers of myelination, providing nutritional building blocks as well as energy. Deficiencies in folate, vitamin B12, Docosahexaenoic acid and iron for example have been shown to severely reduce myelination, alter myelin composition or decrease myelin synthesis.[1,4-7]

Therefore, myelination may provide a tangible neurophysiological target for identifying and studying the effects of nutritional solutions aiming at supporting cognitive development.

To better understand the relationship between infant nutrition, myelination and cognitive development in healthy infants and children, we reached out to experts in myelin imaging in infants and young children.

Project CONNECT: Identifying and testing nutritional solutions to support learning and cognitive development in healthy infants and young children

Project CONNECT aims to identify and test nutritional solutions for early cognitive development through optimal developmental myelination. A previous observational cohort, using neuroimaging techniques to measure brain myelin content in healthy children aged 0 to 5 years, allowed the identification of key nutrients impacting the myelination process and the cognitive abilities.

The current project entails preclinical and clinical activities that are performed in collaboration with renowned researchers from Memorial Hospital of Rhode Island (Pawtucket, Rhode Island, USA), Harvard Medical School (Boston Children's Hospital, Boston, USA) and from the University of Edinburgh (UK).

In March 2017, Wyeth Nutrition, in collaboration with the Nestlé Research Center (NRC) in Lausanne, began a multicentre, double-blind, randomised controlled trial in healthy infants to study the effect of key nutrients on brain myelin content using magnetic resonance imaging, and on cognitive development in the first 24 months of life. The trial began in 2017 and is expected to finish in 2021. Professor Sean Deoni (Memorial Hospital of Rhode Island) is the trial lead investigator and principal investigator for his site. Professor Ellen Grant is the principal investigator at Harvard Medical School.

Information on the clinical trial can be found on ClinicalTrials.gov, a database of publicly and privately supported human clinical studies, which is provided as aservice by the U.S. National Institutes of Health. www.ClinicalTrials.gov, NCT03111927.

These study results when considered in synergy with other clinical studies of the brain development clinical study programme, like the Baby Connectome Project (http://babyconnectomeproject.org/), will enhance the understanding of how nutrition impacts brain and cognitive development.

About Wyeth Nutrition

For the past 100 years, Wyeth Nutrition has pioneered innovative nutrition science with premium-quality products that meet the needs of infants, young children and adults.

Wyeth Nutrition was acquired by Nestlé in 2012 and operates as a part of Nestlé Nutrition.

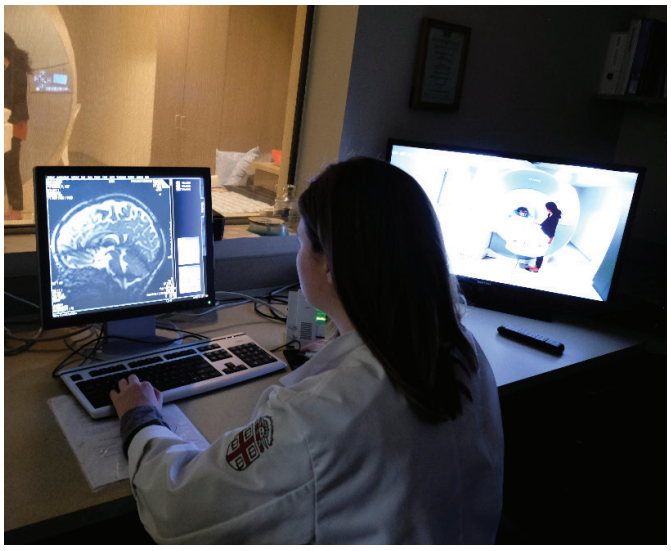

Image 1: View of the magnetic resonance imaging scanner at the Advanced Baby Imaging Lab (Memorial Hospital) that will be used in the frame of the clinical trial.

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Image 2: View of the magnetic resonance imaging scanner at the Advanced Baby Imaging Lab (Memorial Hospital) that will be used in the frame of the clinical trial.

Image 3: Clinical trial team at the Memorial Hospital of Rhode Island.

Ask the expert

Professor Sean Deoni

Q: What is the most exciting prospect of this study for you and your team?

Professor Sean Deoni: As a research imaging scientist, the most exiting aspect for myself is the ability to meaningfully contribute to child health. If we are successful, this will be a high-water mark in our careers in translating bench to bedside to actual child outcomes. More than just talk, we can have an impact.

Q: What makes this study truly ground-breaking?

Professor Sean Deoni: The truly ground-breaking part for myself is the breadth of expertise being brought together, spanning nutrition science, epidemiology, maternal health and paediatrics, public health, imaging physics, neuroscience, and neurobiology. Combining preclinical and human science all working towards the same goal with the whole will be substantially greater than the sum of the parts.

Over the past 3-4 years, our lab has begun to focus not only on visualising how the brain grows, but really trying to understand the main influences that shape and alter patterns of development. Amongst the many varied factors, nutrition is perhaps the most readily modifiable and yet can profoundly affect brain development. Working on Project CONNECT offers a unique opportunity to more closely examine the influence of infant nutrition on brain development and cognitive outcomes, and to translate that knowledge into actually helping millions of children every year achieve their potential.

Key takeaways

- Wyeth Nutrition has been pioneering advances in Nutrition Science for over 100 Years.
- Project CONNECT found evidence to support a link between early life nutrition, developmental myelination and cognitive abilities.
- This ground-breaking work is a testament to our commitment to understand early childhood development, particularly in the area of brain and cognition, and how good nutrition can impact these processes and outcomes.
- The results of this study will enable us to provide innovative and scientifically substantiated infant formula products containing specific nutrients impacting developmental myelination and cognition in a manner that is similar to that of breastmilk.

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