

Acronym: NEUROBID

Title: NEUROSCIENCE ON BARRIERS IN DEVELOPMENT

Contract number: HEALTH-F2-2009-241778

EC contribution: 3 million euro

Duration: 42 months

Starting date: 01/01/2010

Instrument: Small or medium-scale focused research project

Summary:

Brain diseases are one of the most prevalent groups of diseases in Europe with estimated annual costs amounting to 386 billion Euros. Data collected by the WHO suggest that brain diseases are responsible for 35% of Europe's total disease burden. In the treatment of neurological disease, the blood brain barrier (BBB) still represents an obstacle for the delivery of drugs to the brain and thus a major challenge for the development of therapeutic regimens. Understanding the molecular basis and functioning of the BBB in health and disease, including transport mechanisms across the BBB, therefore holds significant potential for future strategies to prevent and ameliorate neurological disease. Recent research indicates that the cause of some neurological disorders can be traced to the developmental stage. The major goal of the NEUROBID project is thus to understand the molecular mechanisms and function of the BBB in health and disease, both in the developing brain and the adult central nervous system. The interdisciplinary consortium from the fields of developmental neurobiology and BBB research will seek to (i) understand the involvement of normal and disturbed BBB function in normal and abnormal brain development and (ii) to develop novel strategies for drug delivery to the brain. Unique transport mechanisms across the BBB will be used to target potential therapeutic macromolecular and cellular agents specifically to the brain barriers and transport them into the brain. NEUROBID will focus primarily on non-inherited neurodevelopmental disorders arising from perinatal adverse exposure, such as cerebral palsy, and classic adult neurological disorders, such as multiple sclerosis and stroke. In the long term, NEUROBID hopes to pave the way for new treatment strategies and thus reduce the economic and social burden of neurological disease.

Background:

Brain disease, encompassing both psychiatric and neurologic disease, represents a major public health problem in Europe and worldwide. It is one of the most prevalent and costly groups of diseases in Europe, with estimated total annual costs amounting to 386 billion Euro or 829 Euro per individual living in Europe. Data collected by the World Health Organization (WHO) suggest that brain diseases are responsible for 35% of Europe's total disease burden. An analysis of all epidemiological and health economic studies in Europe published by the European Brain Council in 2005 found that across 28 European countries (EU-25 plus Iceland, Norway, and Switzerland) with a total population of 466 Million, 127 million (or 27%) of Europeans, children and adults at all stages, are affected by at least one form of brain disease. Improved prevention and treatment strategies are paramount in the attempt to reduce

the individual and societal burdens associated with cerebral palsy, multiple sclerosis, stroke, schizophrenia and the many other devastating disorders that involve the central nervous system (CNS).

In this scenario, prevention and treatment options rely heavily upon optimized drug access to the CNS. The major barriers between the systemic and CNS compartments are the blood-brain parenchyma barrier (microvessels) and blood-cerebrospinal fluid barrier (choroid plexus). The NEUROBID project intends to build on the growing evidence that neurodevelopmental aspects are a key component of many neurologic disorders not only among children, but also among adults. The consortium brings together academic and small company investigators from the overarching research fields of developmental neurobiology and blood-brain barrier research, and a wide range of interdisciplinary technical and specialist expertise.

Aim:

In light of growing evidence that neurodevelopmental aspects are a key factor in many neurologic disorders amongst both adults and children, the major goals of the NEUROBID consortium are to study the BBB in the developing brain (i) to improve understanding of neurological disorders of infancy and those in adults with developmental antecedents and (ii) to develop novel drug delivery strategies to the brain for large molecules. With this developmental focus, we will study the BBB in the context of adverse perinatal exposures (such as systemic inflammation and hypoxia-ischemia) and adult neurologic disease models (such as stroke and multiple sclerosis).

Expected results:

The major immediate impact of the NEUROBID project is its contribution towards a better understanding of the normal characteristics and function of the developing BBB. It will also lead to improved knowledge about its dysfunction, protection and restoration in disease. As a long-term impact, we are confident that the NEUROBID project has the strong potential to make a substantial contribution towards the reduction of neurologic disease burden in children and adults. We believe that the translational results of NEUROBID will lead to improved management strategies for neurologic disorders with the potential to reduce the associated high healthcare costs.

Potential applications:

The potential applications that might arise from this project involve novel strategies for drug delivery to the brain. A better understanding of the involvement of normal and disturbed BBB function in normal and abnormal brain development and this translation of this knowledge to potential new clinical and industrial development of mechanisms and interventions also holds the potential to strengthen European leadership in clinical therapeutics.

Project website:

www.neurobid.eu

Key words:

Blood brain barrier, Developmental disorders, Neurological Disorders, Neuropharmacology

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