



## What causes complications after stroke and how to prevent them?

*The department of neurosurgery of Maastricht University Medical Centre+ and clinical stage biotech Neuroplast start research on factors that cause delayed cerebral ischemia after subarachnoid hemorrhage.*

Suffering from a stroke is bad enough as it is. But for many patients it does not stop there. Tens of thousands of people develop a condition that causes oxygen deficiency in the brain days or weeks after the stroke took place. The problem is that we do not yet know which patients are at risk and how to adequately prevent this from happening. Understanding this mechanism and subsequently working on methods to prevent or at least reduce the impact to patients is of great interest to both the department of neurosurgery of the Maastricht University Medical Center+ and stem cell biotech Neuroplast.

*SAH/Subarachnoid hemorrhage: type of stroke*

*DCI/Delayed cerebral ischemia: oxygen deficiency in the brain as a complication after SAH*

A Subarachnoid hemorrhage (SAH) is a type of stroke, that annually affects approximately 30,000 people in the USA and 67,000 in Europe. Up to 40% of these patients suffer from an oxygen deficiency in the brain that develops a few days or weeks after the stroke. This condition, called delayed cerebral ischemia (DCI), often leads to additional injury and worsening of their neurological condition. As such, DCI causes increased disability, prolonged hospitalization and increased mortality.

### **This research is an important step to recognize and prevent delayed cerebral ischemia**

Neurosurgeon Dr. Roel Haeren and PhD student in neurosurgery Hanna Schenck, both from Maastricht University Medical Center+ (MUMC+), set up a study to learn more about the dynamics that lead to DCI after SAH.

Schenck: "Our goal is to gain a better understanding of the multiple factors that play a role in the underlying processes from the moment a hemorrhage takes place until the manifestation of delayed cerebral ischemia." Haeren adds: "Studies like these are needed to develop novel preventive and treatment strategies." According to Haeren, the prevention and treatment of complications such as DCI are of utmost importance to improve the clinical outcome of SAH patients.

Particularly, the investigators aim to clarify two things: Firstly, the dynamics of inflammation in the occurrence of DCI. Secondly, the role of the brain's microcirculation. For a long time, DCI was thought to be caused by spasms of the large arteries. However, many patients with DCI do not develop spasms, and inversely, not all patients with spasms develop DCI. This has led to a paradigm shift and an increased interest in mechanisms that take place at a microvascular level including neuroinflammation, oxidative stress and thrombosis. All of these processes are influenced by a gel-like layer covering the inside of blood vessels called the glycocalyx. This layer will be studied more closely in this research project. The brain and central nervous system are separated from the blood circulation. Learning more about this helps to pinpoint the best treatment delivery method, as traditional treatment applications are less likely to reach the targeted area.

### **Neuroplast technology platform enables advanced analyses**

Neuroplast is specialized in neurodegenerative diseases, where inflammation is commonly seen as a key driver. The clinical stage biotech has developed a stem cell technology that has the potential to modulate inflammation, reduce cell death and restore blood flow in neurodegenerative diseases. Neuroplast contributes to this study financially, but also makes its lab facilities and technology platform available for measurements, analyses and cryo storage. The study is expected to result in more in-depth understanding of the mechanisms that the technology could influence, to prevent the occurrence of DCI and the irreversible damage that comes with it.

Haeren: "Working with Neuroplast enables us to perform advanced and extensive analyses of inflammatory markers that are potentially associated with the occurrence of delayed cerebral ischemia." "We will closely monitor SAH patients for a period of two weeks," Schenk elaborates. "We will perform a variety of measurements to analyze two things: Firstly, inflammatory molecules called cytokines and secondly, markers of endothelial and glycocalyx damage, meaning damage to the interior surface of blood vessels. If a patient develops DCI, the measurements will intensify."

### **One technology, broad clinical pipeline**

For Neuroplast, the collaboration with MUMC+ is the next step in broadening its clinical pipeline. The technology is currently studied in a Phase II clinical trial for Traumatic Spinal Cord Injury. In addition, there is existing preclinical evidence available for applications in Frontotemporal Dementia and Amyotrophic Lateral Sclerosis.

Neuroplast CEO Johannes de Munter: "This collaboration enforces the growing evidence that the Neuroplast technology has the potential to effectively treat several high-impact neurodegenerative conditions for which no effective treatments exist. We are very proud to go on this journey with such strong partners from the region."

=== E N D ===

### **About Neuro-Cells®**

Neuro-Cells® is a transformative stem cell technology under GMP in the crucial first phase after sustaining damage to the central nervous system, during which irreversible impact can be radically reduced. Traumatic Spinal Cord Injury is the first targeted therapeutic area in a wider clinical development agenda. It contains non-substantially manipulated bone marrow-derived hematopoietic and mesenchymal stem cells, manufactured from a patient's own bone marrow (donor and receiver are the same person). Inflammatory inducing components and pathogens are removed during this process. The combination of a) autologous treatment and b) intrathecal application in c) acute setting is what makes Neuro-Cells® unique.

### **About Neuroplast**

Neuroplast is a Dutch stem cell technology company focusing on fast-track development programs using autologous cell products for treatment of neurodegenerative diseases, with the aim of giving back perspective to people who suffer from those conditions.

The company was founded in August 2014 by physician Johannes de Munter and neurologist Erik Wolters. Current funders are Lumana Invest, Brightlands Venture Partners, LIOF and the Netherlands Enterprise Agency. Neuroplast is located at Brightlands Chemelot Campus in The Netherlands.

### **About Maastricht University Medical Centre+ (MUMC+)**

Maastricht University Medical Centre+ is a partnership between Maastricht University Hospital and Maastricht University's Faculty of Health, Medicine & Life Sciences. MUMC+ is a referral hospital for patients with subarachnoid hemorrhage from all over the province of Limburg.

### **About Lumana Invest**

Investment company Lumana was established by entrepreneurs and unique due to not having a predetermined investment horizon. The Lumana founders showcase strong commitment to their portfolio companies by actively supporting management in strategic decision making.

### **About Brightlands Venture Partners**

Brightlands Venture Partners (BVP) is the fund manager of Chemelot Ventures and is a so-called ecosystem investor. BVP invests in companies benefiting from and contributing to the Brightlands campuses in the south of The Netherlands. Other funds under management are BVP Fund IV, Brightlands Agrifood Fund and Limburg Ventures. The funds of BVP focus on sustainability and health; together the funds have made over 40 investments.

### **About LIOF**

LIOF is the regional development agency for Limburg and supports innovative entrepreneurs with advice, network and financing. Together with entrepreneurs and partners, LIOF is working towards a smarter, more sustainable and healthier Limburg by focusing on the transitions of energy, circularity, health and digitalization.

### About The Netherlands Enterprise Agency

The Netherlands Enterprise Agency operates under the auspices of the Dutch Ministry of Economic Affairs and Climate Policy. It facilitates entrepreneurship, improves collaborations, strengthens positions and helps realize national and international ambitions with funding, networking, know-how and compliance with laws and regulations.

### Forward looking statements

All statements other than statements of historical facts, including the statements about the clinical and therapeutic potential and future clinical milestones of Neuro-Cells<sup>0</sup>, the indications we intend to pursue and our possible clinical or other business strategies, and the timing of these events, are forward-looking statements. Forward-looking statements can be identified by terms such as “believes”, “expects”, “plans”, “potential”, “would” or similar expressions and the negative of those terms. These forward-looking statements are based on our management’s current beliefs and assumptions about future events and on information currently available to management. Neuroplast B.V. does not make any representation or warranty, express or implied, as to the improper use of this article, accuracy, completeness or updated status of above-mentioned statements. Therefore, in no case whatsoever will Neuroplast B.V. be legally liable or liable to anyone for any decision made or action taken in conjunction with the information and/or statements in this press release or for any related damages.

---

### In case of any further questions, please contact:

#### **Neuroplast**

Johannes de Munter, CEO

T: +31 (0)85 076 1000

E: h.demunter@neuroplast.com