



Primo Vascular System in Brain

Nano Primo Research Center

1. Objective of research

Imaging Method of the Primo Vascular System (PVS) network in a brain will be developed. Monitoring system of the Primo Node in brain will be developed as a diagnostic tool for various brain function states and diseases. Extraction method will be developed for analysis of biological molecules and Sanals in the Primo Node. Injection and stimulation system will be applied to the Primo Node for treatment of brain diseases.

2. Contents of research

The Primo Vascular System (PVS) network extends throughout the brain, spine, and peripheral nervous system. It is mainly composed of Primo nodes and Primo vessels. It is a new circulatory system different from the blood and lymphatic systems.

PVS can be observed using various organic and fluorescent dyes: such as trypan blue, hematoxylyn or fluorescent nanoparticles. The dyes are injected into brain ventricles and they circulate following the path of cerebrospinal fluid (CSF) and spread throughout the subarachnoid space (SAS) in brain to make it possible to visualize the PVS.

From this visualized PVS, the primo liquid can be extracted and analyzed with various methods such as genomics and proteomics.

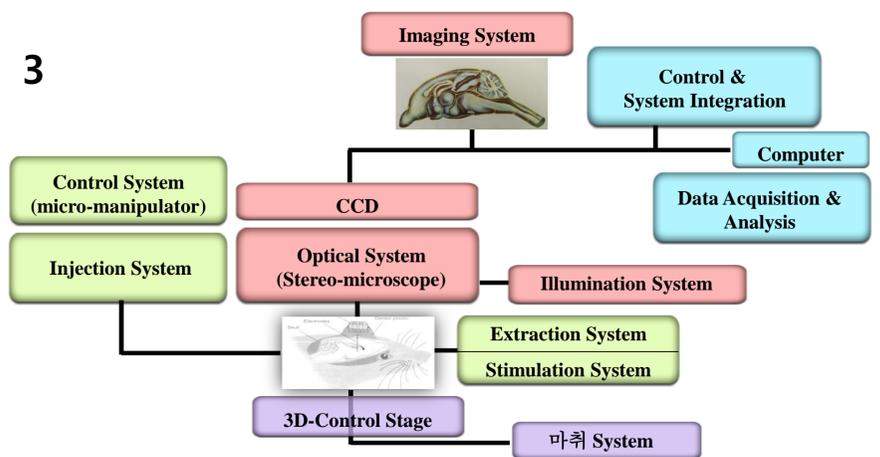
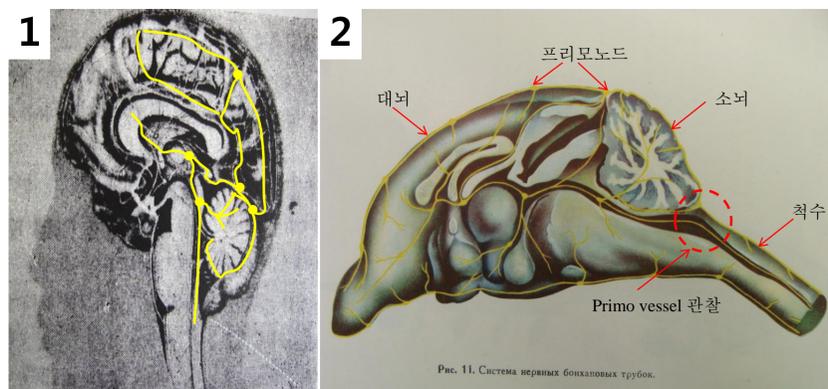


Figure 1. The PVS in brain . (Kim Bonghan) The yellow lines are the primo vessels. The thick elliptical-shaped spots are primo nodes. It is seen that the PVS spreads over the whole brain from the ventricles to the surface and inside of brain. **Figure 2.** The PVS in rabbit brain. It is seen that the primo vessels make network structure in brain . (Bonghan Kim, 1965) **Figure 3.** Illustration of PVS monitoring system.

3. Result of research

The Primo vessel in the 4th ventricle toward the central canal of the spine of a rabbit was visualized with hematoxylin. The primo vessel is lifted with a needle to show that it is a floating structure in the cerebrospinal fluid (CSF). Its position in brain shown in the right inset.

Nanoparticles were injected into the lateral ventricle of a rat brain. The nanoparticles were absorbed by the primo vessel in the 4th ventricle.. The fluorescence of nanoparticles revealed otherwise invisible primo vessel floating in the 4th ventricle.

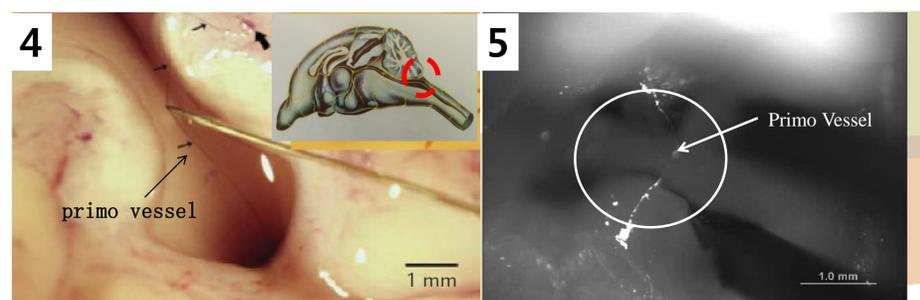


Figure 4. Stereomicroscopic images at the bottom of the fourth ventricle beneath the cerebellum with hematoxylin application. **Figure 5.** Primo vessel in the rat brain is stained with fluorescent nanoparticles.

4. Further Research

- Imaging of the whole network of PVS in brain and monitoring
- Biomarkers for diagnostics of brain diseases (Alzheimer Disease and Brain Tumor) from PVS
- Treatment of brain diseases by stimulation of Primo Node
- Drug delivery for cancer through Primo Node
- Regeneration of neuronal cells with Sanals (primo microcells) from Primo Node

5. Participants

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