

## Third Circulatory System may Offer Cancer, Alzheimer's Cures

[Special Features](#) <sup>[1]</sup>

Korean Researchers Claim Discovery of New System in Human Body

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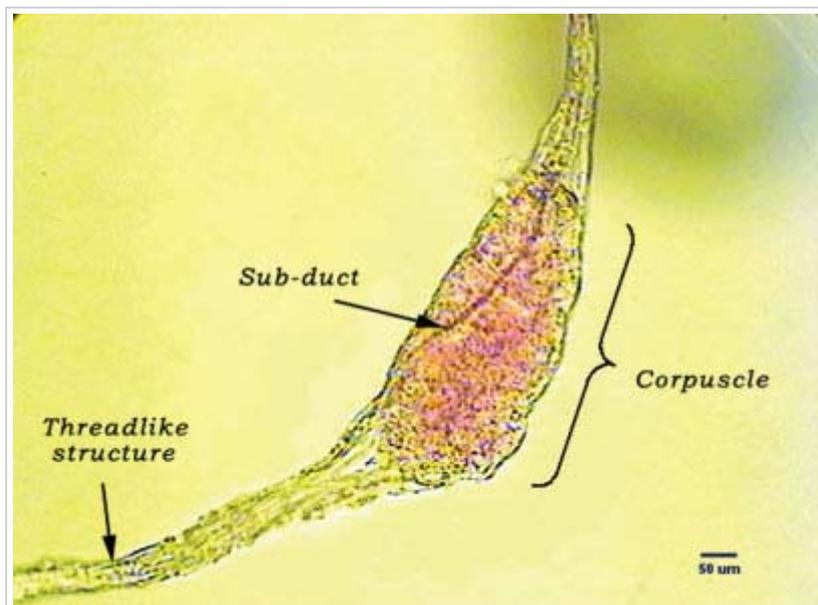
[Matthew Weigand](#) <sup>[2]</sup>

When someone claims that he has discovered a third system in the human body on par with the circulatory and lymphatic systems, it tends to raise red flags. After all, there haven't been any hot anatomical discoveries since the 18th century. Such a claim sounds a bit like claiming to have discovered a new continent or an additional property of triangles. Talk to any anatomy professor and you will observe the unique confidence of a master of a completely known field of knowledge.

But when I met Dr. Soh Kwang-Sup at the Advanced Institutes of Convergence Technology in Suwon, his calm,

unassuming smile encouraged me to relax and listen to what he had to say. And over the course of the next few hours, his well-documented efforts to unlock a previously unobserved puzzle and his frank assessment of research in progress was more convincing than the well-exercised skepticism of this reporter could withstand.

Dr. Soh, formerly a physics professor at Seoul National University, opened a laboratory in 2002 to do research on what has been dubbed the primo vascular system. In short, the primo vascular system is a new circulatory system that exists independently of the system of blood vessels in the body, and also independently of the lymphatic



<sup>[3]</sup>

**This image identifies threadlike structures, which correspond with primo ducts, and corpuscles, which correspond to primo nodes. The nomenclature for this new system has been evolving as more information is found.**

circulatory system. This third system is a network of vessels and nodes, and has been overlooked so far for several reasons. The vessels and nodes are quite small, transparent, and do not stain differently from the surrounding connective tissue in which they are usually found. However, the development of a new method of staining the tissue with Trypan blue dye by the laboratory in 2008 has made studying the primo vascular system much easier.

"Trypan blue dye is a very common dye," explained Dr. Soh. "It can be seen in every biological laboratory. It is used usually to test whether a cell is alive or dead. Only dead cells become stained." He went on to explain that unlike the surrounding living tissue, the primo vascular system does absorb Trypan blue. This phenomenon does not result because the primo vascular system consists of dead cells, but because the vessels have many porous areas in their structure. If a living tissue sample is stained with Trypan blue and then quickly washed with water to remove the dye, only the primo vascular system becomes stained, making it easy to spot.

After staining, one can see the unique characteristics of primo nodes and ducts which differentiate them from the two other well-known circulatory systems. The ducts are about 0.02 to 0.05 mm across, which is quite small to make out with the naked eye. However, the ducts usually come in bundles of 4 or 5 sub-ducts together, which make them a little easier to differentiate from blood or lymph vessels under a microscope. The primo nodes are much bigger, from 0.1 to 2 mm wide. While these structures have not yet been exhaustively mapped, the educated guess of Dr. Soh's laboratory is that together the ducts and nodes form a delicate and transparent web throughout the body. "We haven't reached the level yet of mapping the whole system, but we know that the system exists in the brain, in the heart, along the blood vessels, inside blood vessels, and along and inside lymphatic vessels," he explained.

The laboratory has spent the past few years on the delicate practice of tracking down and identifying the primo vascular system in one particular spot in many mammals – the brain. Underneath the sagittal sinus, in the dura mater, Dr. Soh's laboratory has identified a very large primo vessel. So far, this primo vessel has been tagged in the brains of rabbits, rats, and mice. The laboratory is slowly building on these successes to learn how to reliably identify branches of the primo nodes which they anticipate will follow paths that are distributed throughout the entire brain.

Although conclusive evidence has not yet been found, Dr. Soh believes that the primary purpose of the primo vascular system is the circulation of primo microcells, small cells heavy with DNA granules that have been identified in the system. Dr. Soh suspects that these cells may in fact be the same as, or similar to, the Very Small Embryonic-Like (VESL) stem cells recently found by Dr. Ratajczak of the University of Louisville. Dr. Ratajczak successfully isolated and identified VESL stem cells from bone marrow, but he reported them to be extremely rare. These cells are significant because they seem to behave like embryonic stem cells, having the ability to differentiate into any other type of cell and thereby repair tissue damage. If these cells are indeed transported throughout the body through the primo vascular system, including the bone marrow, that would strongly indicate the primary function of the primo vascular system to be transportation of these cells.

The focus on the primo vascular system in the brain is no accident. Dr. Soh hopes to find evidence of the primo vascular system's involvement in brain-related diseases such as Alzheimer's and dementia. He believes that if the role and relationship of the primo vascular system and VESL stem cells can be thoroughly understood, the system can be manipulated to lend a greater hand in healing such diseases. "We believe that age-related diseases are organ damage due to people becoming older and living



[4]

**Dr. Soh Kwang-sup.**

longer and longer. Those diseases can best be dealt with by a tissue regenerating system," explained Dr. Soh. "This regeneration system may be the primo vascular system, therefore we believe that understanding this system is very crucial now."

Dr. Soh also hopes to discover the potential for cancer treatment in the primo vascular system. There is preliminary evidence that the primo vascular system is more prevalent in and around tumors. The possibility exists that it could serve as a third avenue of cancer metastasis that could be blocked off in order to slow or stop the spread of cancer. Also, the primo vascular system might be able to serve as a drug delivery avenue. If the system could be mapped out and completely understood, anti-cancer drugs could be inserted into the precisely appropriate place in a patient's

body so that they could be taken downstream and into the cancerous area.

Curing Alzheimer's and cancer are not the highest hopes of Dr. Soh, however. He also hopes to link the primo vascular system to the meridians that underlie the oriental medicine practice of acupuncture. If there is a link, the exact effect of acupuncture could be scientifically observed and quantified, and one of the biggest rifts between traditional oriental medicine and modern western medicine could be mended. This would further advance the understanding of the human body and the potential repertoire of every doctor in treating illness.

The first study of this primo vascular system was actually conducted in the 1960s by Dr. Bonghan Kim, a North Korean scientist who published a few papers on the idea of a primo vascular system. Unfortunately he did not reveal the dyes or methods he used to get his results, so the research lay dormant for quite some time. Dr. Kim claimed that microcells inside the primo vascular system conducted cell therapy, although the term as he used it had no equal in the scientific discourse of the time. However, since then the idea of stem cells and tissue regeneration has been scientifically detailed, and matches up remarkably well with Dr. Kim's claims. If he had not been working in isolation in a regime hostile to international cooperation this system might have been thoroughly explored by now.

This reporter's final reservations were laid to rest after Dr. Soh explained the work he was engaged in to spread word of the primo vascular system and seek out partners. The signature stance of the pseudo-scientific quack is his desire to present himself as an oppressed minority, indignant at his idea's rejection by the greater scientific community and raging against the obtuse establishment. Dr. Soh never did anything of the sort. Instead he was actively seeking out means of gaining acceptance for his work through the normal scholarly avenues. He was completely at ease with the task ahead of him to slowly but steadily spread his laboratory's work throughout the scientific community. "Seeing is believing," he repeated several times during the interview. So far, the laboratory has published several peer-reviewed papers in respected journals, and more are on the way dealing with advancements in the staining and imaging processes. In 2010, Dr. Soh organized a symposium on the primo vascular system

which featured approximately 20 invited speakers from around the world. The International Symposium on Primo-Vascular System ([www.isps2010.org](http://www.isps2010.org) <sup>[5]</sup>) was explicitly aimed at encouraging other laboratories to duplicate and verify Dr. Soh's laboratory's results. Dr. Soh mentioned that Dr. Achilefu of Washington University and Dr. Miller of the JG Brown Cancer Center of the University of Louisville both attended. He was most excited that as a result of the symposium, several laboratory teams in the US have started their own experiments to verify the work.

Dr. Soh anticipates wider acceptance of the primo vascular system as the results of his work are duplicated around the world. He believes that after the first experimental results by US research groups are published in the next few years, the idea will catch on and more groups will become involved in primo vascular system research. "Our idea is completely new to many. No one has a preconceived idea of this system, so they cannot accept it after reading a paper or two," he said, bringing his physics training into the subsequent explanation. "It requires a critical mass before it can begin propagating more rapidly."

Dr. Soh's laboratory is now continuing its work of identifying and verifying the primo vascular system in lower mammal brains, and will continue to lay the foundation for wider study of this strange new system in the human body. His work is definitely something to watch in the next few years, especially if even one of his educated guesses comes true. And since he has published studies already in PloS ONE and Molecular Imaging and Biology, it will not be too difficult to keep up with the research. Perhaps this work will lead to a treatment for Alzheimer's, a cure for cancer, or a precise and manipulable stem cell delivery system – even just one of these goals reached would be enough to define his work as a paradigm-changing breakthrough.

#### Special Features

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