

## Bonghan Channels in Acupuncture

By David Milbradt, LAc

As a practicing acupuncturist, I find that I continually wonder how a few well-placed needles can have such transformative results in my patients. Over the past 10 years I have read explanations that vary from the vague and mystical idea that the needles move qi in the meridians to scientific explanations where the effects of acupuncture stimulus are explained entirely by its influence on the nervous system. I read all of these theories with interest, but somehow they do not quite explain the day-to-day changes that I see in my clinic. Most of these theories seem limited and tend to restrict or underestimate the diversity of healing responses that I see in my patients.

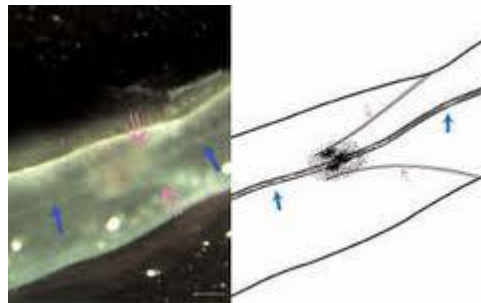
Recently, however, a number of scientific papers have been published that have the potential to revolutionize our understanding of how acupuncture works. A group of Korean researchers have rediscovered threadlike microscopic anatomical structures that correspond with the layout of traditional acupuncture meridians or channels. Acupuncture channels are no longer imaginary lines, but specific anatomical structures that, until now, have not been recognized by current theories of anatomy. These channels have been found inside of blood and lymphatic vessels and they also form networks that overlay internal organs.

The channels are called Bonghan channels after Kim Bonghan, a North Korean who published papers describing them in the 1960s, a decade before acupuncture was introduced to the American public. Although his discoveries were confirmed by the Japanese researchers Fujiwara and Yu in 1967, his work was discounted by other scientists because he never revealed his formula for the staining dye that revealed these structures. Almost 40 years later, Kim's discoveries have been confirmed by a variety of studies with rats, rabbits and pigs. Stereo-microscope photographs and images from transmission electron microscopy in the research papers show assemblies of tubular structures 30 to 100 nm wide (red blood cells are 6-8 μm in diameter).

Apparently these structures have remained undiscovered for so long because they are almost transparent and so thin that they are barely visible with low-magnification surgical microscopes. They are also easily confused with fibrin, which coagulates and obscures these structures when there is bleeding in dissected tissues. Now that they have been rediscovered, researchers are investigating their composition and function. The tubular structures that make up Bonghan channels contain a flowing liquid that includes abundant hyaluronic acid, a substance that cushions and lubricates the joints, eyes, skin and even heart valves. Also visible in the photographs are small granules of DNA or micro cells about 1-2 μm in diameter that contain chromosomal material highly reactive to stem-cell antibody stains. When these cells were isolated and then induced to differentiate, they grew into cells of all three germ layers. These may be our body's natural source of pluripotent adult stem cells, with the potential to develop into any cell in the body.

Bonghan channels are also being compared to fiber-optic channels in the body. These channels may be able to carry an extremely high density of information far beyond the limited, one-way signals of the nervous system or the diffusive information carried by hormones in the blood stream. A 2004 paper describes how bio-photons, produced by animal tissues, may be emitted by DNA molecules to produce a laser-like coherent light capable of carrying an enormous volume of information through the Bonghan channels. The idea that acupuncture channels conduct light has already been substantiated by Russian research published as early as 1991. They found that the light-conducting ability of the human body exists only along the meridians, and can enter and exit only along the acupuncture points. This finding has been confirmed by a 1992 study in the *Journal of Traditional Chinese Medicine* and a 2005 study in the *Journal of Alternative and Complementary Medicine* where moxibustion and infrared thermography were used to trace meridian pathways.

Figure 1. A stereomicroscopic image of the lymphatic vessel around the caudal vena cava of a rat. The photograph (below | left) and its illustration (below | right) show the novel threadlike structure (solid arrow) that passes through the lymphatic valve (open arrow). The photograph was taken in vivo and in situ, and a piece of black paper was put under the lymphatic vessel to exhibit the target clearly. The scale bar is 100  $\mu$ m.



Kim Bonghan believed that the meridian system of communication was in charge of the formation of the embryo and the control of growth throughout the organism. He did a series of studies on the embryonic development of the meridian systems of various animals. He found that a chicken embryo begins to develop Bonghan channels within 15 hours of conception. It appears that Bonghan-channel communication directs the development of all internal organs and may provide critical information-feedback loops that create bilateral symmetry in our body.

The science of embryology has a clear understanding of only the very earliest stages of fertilization and development. The unfertilized egg has a top and bottom, but there is no distinction between left and right or front and back. An acupuncturist would say that the orientation of ren and du meridians has not yet been established. Without this primary axis of orientation, the embryo cannot develop. The stimulus must come from the outside world and it is provided by the action of the sperm entering the egg. From that moment on, a guideline is laid out from the entry point of the sperm to the top and bottom poles of the cell. The first time the fertilized egg divides into two cells everything lines up along that meridian. As the embryo continues to develop the side on

which the sperm has entered becomes the belly or yin side, which is subdivided into right and left orientations by the ren meridian. The opposite side is the back or yang side which is subdivided by the du meridian.

In *Mind and Nature*, Gregory Bateson says that what happens next is a mystery in the science of embryology. *What controls the nearly perfect external bilateral symmetry of the mammalian body? We have remarkably little knowledge of the message system that controls growth. There must be a whole interlocking system as yet scarcely studied.* Bonghan channel researchers appear to have discovered that system. It is the only anatomically distinct structural network that could possibly handle the high volume of information that would be necessary to control embryological organization.

This relationship between acupuncture and embryology has also been explored by Charles Shang, MD, who pointed out several striking physiological similarities between acupuncture points and embryological organizational centres. Both are areas of high electrical conductance and both contain a high density of gap junctions, cellular organelles that facilitate cell to cell communication. Shang theorizes that the acupuncture points are the same as the discrete organizational centres that embryologists have found to control the development of embryos. He postulates that this system of growth control centres or acupuncture points shape the embryo and then persists in mature organisms for the purpose of coordinating information, regulating homeostasis and managing the complexities of ongoing repair and renewal of the body at a cellular level. Although Shang's writing predates the recent research on Bonghan channels, he theorizes: *The meridians may be a convenient way of activating intrinsic adult stem cells.*

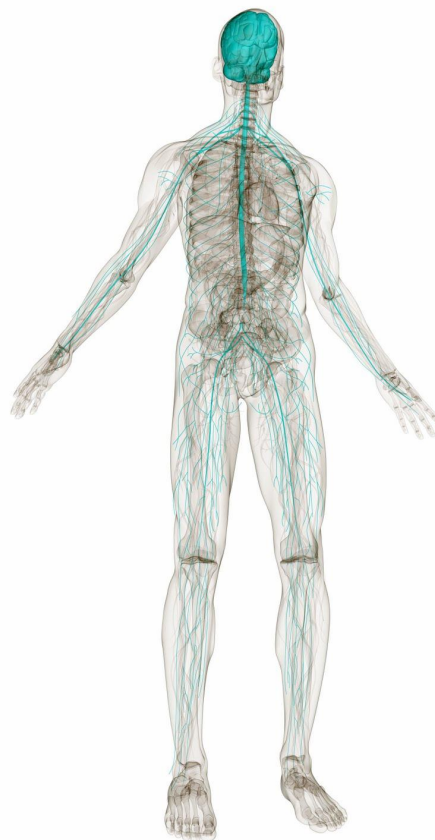
Because the meridian system organizes the development of the embryo from the very beginning, well before the circulatory and nervous system are established, it is not surprising to find that these systems often overlap and interact. Many studies have clearly shown that the stimulation of the meridian system has a profound effect upon both local blood circulation and imbalances in the nervous system. Furthermore, because embryonic development reflects evolutionary development, it is quite likely that the meridian system has more ancient origins than other physiological systems. Shang states, *Its genetic blueprint might have served as a template from which the newer systems evolved.*

Plants do not have a nervous system, yet they display a high degree of structural organization and complex responses to their environment. Research published in *Scientific American* in August 1984 that describes the effects of light transfer through plant stems may have been looking at the ancestral precursors of the meridian system.

Shang's growth-control model of the meridian system does much to explain why acupuncture has so few side effects. *Conventional nerve stimulation usually results in unidirectional effects. For example, vagal stimulation slows down heart rate ... However,*

*acupuncture at HG-6 accelerates bradycardia and decelerates tachycardia. Acupuncture at ST-36 suppresses hyper-function (as in diarrhoea) and stimulates hypo-function (as in constipation) of the gut motility. Acupuncture is very different from conventional nerve stimulation because it activates a unique communication network that restores normal function in the body. Activating the meridian system restores both hyper-function and hypo-function to homeostasis; the possibility of any adverse side effects is extremely low.*

I believe that we need to take this line of thought one step further. If acupuncture activates a network of communication that restores normal function in the body, we should not only expect to see the absence of adverse side effects but also expect to see improvements in function and symptoms that go beyond conventional clinical expectations. I think that almost all practicing acupuncturists have seen patients with unexpected improvements that show up after treatments. I am surprised that this is rarely mentioned in journals and never in textbooks. This may be because we have a limited understanding of how acupuncture works and this, in turn, limits the way we measure our success. As acupuncturists, our understanding of how acupuncture works sets up a framework of belief that can either limit or expand our expectations for practice outcomes. We can see acupuncture as a branch of neurology to be applied like conventional drug therapies to temporarily relieve pain or we can believe that we are tapping into a unique system of organization far older and deeper than the nervous system.



## Resources:

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\* Shang C. *The Mechanism of Acupuncture - Beyond Neurohumoral Theory.* 1989.