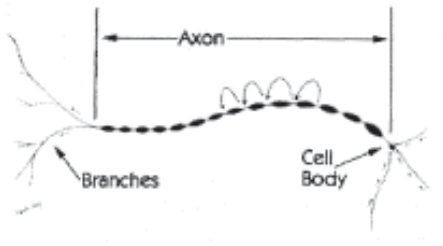
YOGA RESEARCH
The Yoga Research Society Newsletter Number 39 October – March 2008

# What are Nerves Anyway?

## excerpted from *Light at the End of the Carpal Tunnel*

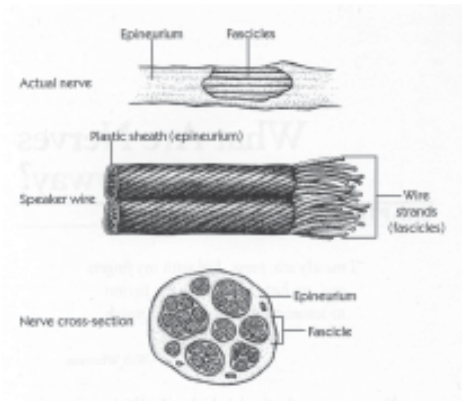
## by Dr. Scott M. Fried

You may remember back in high school biology class when the teacher drew an axon and dendrite of a nerve similar to the one pictured in the figure.




Your teacher told you this was a nerve; it was what made your entire body work. You learned these nerves are located throughout your body in your brain, spinal cord, arms, hands, and legs. They made your body act and react and were responsible for achieving every sort of physical and mental state from agony to ecstasy.

What your teacher may have failed to tell you is just how simple this system actually is. I spent the first year of medical school pouring over physiology books trying to understand just how these little structures, which look like amoebas, made things work. What I have come to understand is nerves function very much like electrical circuits. They simply conduct microcurrents of electricity from point A to point B.




I find it helpful to use the analogy of electrical speaker wire to understand what nerves look like outside of our brain and spinal cord. The thin gold or silver strands of fine wire are analogous to the many fibers (fasciles) within the nerve sheath. The plastic coating on the outside of the speaker wire corresponds to the nerve sheath or epineurium.

Nerves actually look very much like this when viewed under a microscope. Although it would not be practical to wire a stereo

system with our nerves, in essence the function is similar. These axon dendrite connections work in a similar manner to electrical wires. They conduct very low levels of electricity from our brain and spinal cord out to our fingertips and/or toes and then back again. The impulses come from the axon (cell body) and are transmitted through the dendrites.

Nerve conduction involves change in polarization which is a shift of positive and negative ions across a thin membrane. This shift is dependent on blood circulation and other related physiologic factors. Suffice it to say when this local shift cannot occur easily, the overall ability of that nerve to conduct electricity is compromised. This results in a slowing of the speed of conduction. When there is a delay in this speed of impulse conduction, which is predictable, the brain interprets this as abnormal and symptoms occur.

The key factor we need to understand is alterations in this capacity to conduct electricity are the basis of nerve problems. This alteration can be in the ability to conduct impulses *away* from the brain, resulting in disability in motor function, such as clumsiness, tremors or weakness. Conversely, inability to conduct electricity in the opposite direction, i.e. from the fingers back to the spinal cord and brain causes a different scenario. When this reverse conduction becomes a problem, we experience numbness, tingling, altered sensation, and/or pain.

When nerves become pathologically involved or a patient begins to have "nerve symptoms," it is because this ability of the nerve to conduct electricity from point A to point B has been compromised in some way. This compromise can occur anywhere along the path of the nerve from the spinal cord right down to the fingertips. This nerve impairment can result from local pressure or scarring.

When there is constriction or pressure on the nerve in one area only, local symptoms will occur, depending upon which nerve is involved. For instance, if a patient has a carpal tunnel problem, he or she may complain of pain as well as numbness or tingling of the hand in the median nerve distribution, which involves a thumb, index, long, and thumb side of the ring finger. When a nerve is so compromised, the associated symptoms will occur. We must remember, though, this nerve starts out in the neck; therefore, the symptoms may travel up into the neck and arm as well.

Nerves can be compromised in other ways. The epineurial sheath can again be thought of as that plastic coating around the speaker wire. If this is frayed or defective and the wire is "wet" (scarred), then some of those

**Yoga Research Society**
**341 Fitzwater Street**
**Philadelphia, PA 19147**

A **YOGA** RESEARCH subscription is $5.00/year (two issues). Back issues are $3.00 each.

**Yoga Research Society**
and
**Jefferson-Myrna Brind Center**
**of Integrative Medicine**
at Thomas Jefferson University Hospital present

# *MEDICAL YOGA 2008*

2 SUNDAY WORKSHOPS
**APRIL 13 MAY 18**

Courtesy of Gita Press.

Morning Practical with
*Vijayendra Pratap, Ph.D.*
plus Afternoon Presentations by
*Ljuba Lemke, D.M.D.*
*Scott M. Friend, D.O.*

THOMAS JEFFERSON UNIVERSITY
ALUMNI HALL
1020 LOCUST STREET (10th & Locust)
PHILADELPHIA, PA 19107

fibers may be short-circuited. When this occurs, we may get static in our speakers or, in the case of nerves, altered function. This can produce different symptoms according to how significant the defect is and how the nerve is stimulated. Symptoms may be intermittent or constant and will vary in intensity. On a dry "good day," when there is no stress to the circuit, the nerves (wires) function fine. When it rains (a bad day), we will have a problem. This occurs in like manner with nerves.

On a good day when nerves are not overstressed and overtaxed, they may function fine. On bad days, if there is a defect, they may act up significantly. Scar tissue about nerves does not allow them to move or glide well in their tissue beds. This scarring can compromise the nerves' ability to function normally – either by yanking on the nerve when the hand or arm is moved or by essentially strangling the nerve and its blood supply.

Nerves can also be compromised at more than one level in the arm. When this occurs, it is often referred to as a double crush syndrome or multi-level nerve involvement. Basically, the nerves are being pressed, pinched, or pulled (tractioned) at multiple sites. This is not uncommon and often results in a confusing clinical picture.

We usually see double-crush involvement at a level up by the neck and also down by the wrist or hand. When this occurs, we have a dangerous situation. The overall flow and speed of electrical conduction have been slowed to a point which the brain interprets as a significant delay in impulse conduction. This manifests as numbness, pain, tingling, or weakness. These poor victims of multi-level nerve involvement are often labeled with incomplete diagnoses, or worse as "treatment failures" if they still have symptoms after carpel tunnel surgery.

The problem is not with the patient or, at times, with the operation. It is simply only one level of compression has been relieved but that was not the most symptomatic point. It is unfortunate but often instead of looking further, we as physicians, send these patients away to the next program rather than trying harder to understand the real problem.

When you understand how nerves function, you will realize someone who continues to have pain even though the medical community has done "everything" is not at the end. Doctors are not always right, and at times, just don't understand. Doctors are people and can only take a patient as far as their individual understanding will allow. I always tell my patients not to let a doctor stifle their innate abilities to heal. If one physician can't help bring out their inner capabilities, there is almost always another who can.

**Dr. Fried will appear May 18th at Medical Yoga 2008**