

## Scientists say nerves use sound, not electricity

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The common view that nerves transmit impulses through electricity is wrong and they really transmit sound, according to a team of Danish scientists.

The Copenhagen University researchers argue that biology and medical textbooks that say nerves relay electrical impulses from the brain to the rest of the body are incorrect.

"For us as physicists, this cannot be the explanation," said Thomas Heimburg, an associate professor at the university's Niels Bohr Institute. "The physical laws of thermodynamics tell us that electrical impulses must produce heat as they travel along the nerve, but experiments find that no such heat is produced."

Heimburg, an expert in biophysics who received his PhD from the Max Planck Institute in Goettingen, Germany — where biologists and physicists often work together in a rare arrangement — developed the theory with Copenhagen University's Andrew Jackson, an expert in theoretical physics.

According to the traditional explanation of molecular biology, an electrical pulse is sent from one end of the nerve to the other with the help of electrically charged salts that pass through ion channels and a membrane that sheathes the nerves. That membrane is made of lipids and proteins.

Heimburg and Jackson theorize that sound propagation is a much more likely explanation. Although sound waves usually weaken as they spread out, a medium with the right physical properties could create a special kind of sound pulse or "soliton" that can propagate without spreading or losing strength.

The physicists say because the nerve membrane is made of a material similar to olive oil that can change from liquid to solid through temperature variations, they can freeze and propagate the solitons.

The scientists, whose work is in the Biophysical Society's *Biophysical Journal*, suggested that anesthetics change the melting point of the membrane and make it impossible for their theorized sound pulses to propagate.

The researchers could not immediately be reached for comment.

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