

If you would like to volunteer please let your physician know. You can also contact Dr. Kennedy. Some points to consider:

- 1- the purpose of this research is to study nerves that carry sensations of touch and investigate nerves in and around sweat glands.
- 2- the aim is to detect any changes in the function of these nerves very early before neuropathy is severe and when treatment is more effective.
- 3- the participation in research is strictly voluntary in nature.
- 4- If you choose to volunteer any information collected will be strictly confidential.

Your decision whether or not to participate in this study will not affect your current or future relations with the University or University of Minnesota Medical Center Fairview. If you decide to participate you are free to withdraw at any time without affecting those relationships. Thank you for your interest in our Research. No words can express our appreciation for those who decide to participate.

Neuropathy Research

The Kennedy Lab

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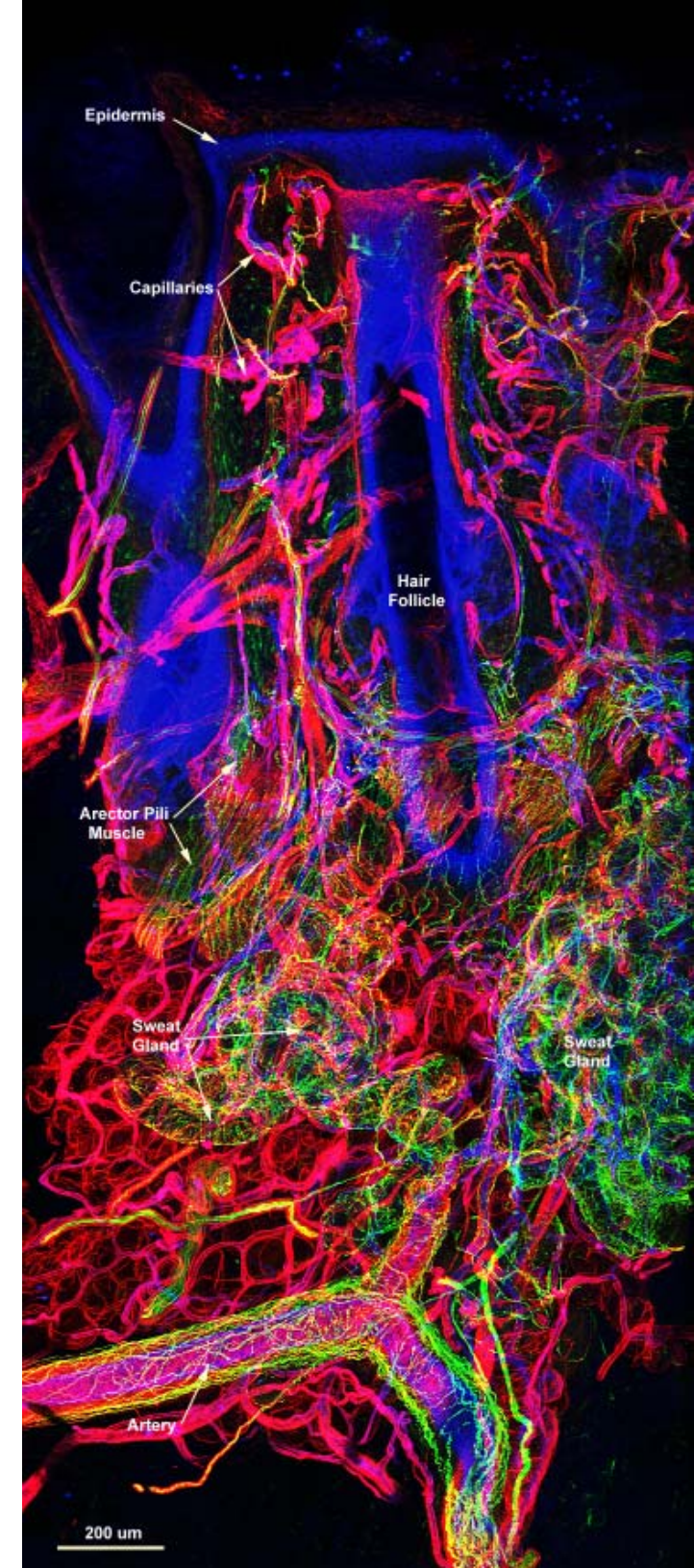
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Please call or email with questions



MEDICAL SCHOOL
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What is Neuropathy?

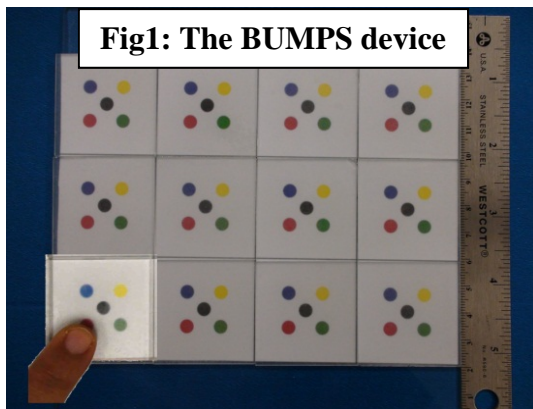
Neuropathy is a disease of the nerves. Symptoms include numbness, tingling or pain that usually start in the feet and hands and later progress toward the trunk. Neuropathy affects almost 50% of people with diabetes and it also may affect subjects undergoing treatment for cancer. Decreased sensation, often results in failure of patients to recognize injuries to extremities. Prevention of neuropathy or treatment of the disease would help to alleviate loss of sensation and related complications.

Is there a test?

A neurological examination can reveal the presence of neuropathy, but cannot accurately quantify its severity or detect it very early.

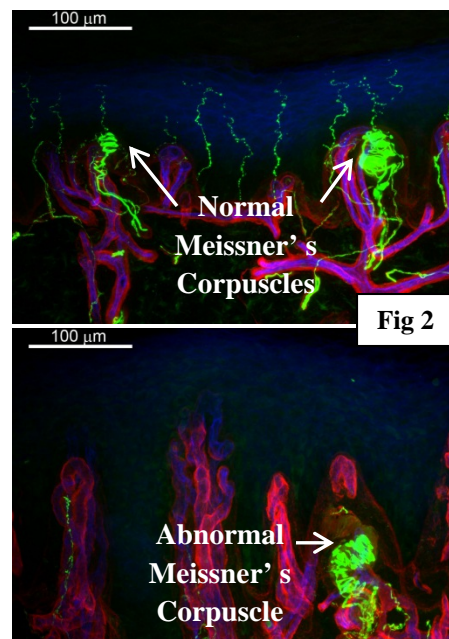
What Does Research Show?

Dr. William Kennedy, Professor of Neurology at the University of Minnesota, has developed new methods for evaluating touch sensation using the "BUMPS" device (fig1) and nerves for regulation of sweat using the "SWEAT" device



(fig3). Both devices accurately quantify nerve function and may detect neuropathy very early. The **BUMPS** device (Fig1) has 12 small 1x1 inch squares. Each square has 'one' bump

located on one of the colored circles. The test requires an individual to locate the bump by feeling with the finger tip. The smallest size bump an individual can feel is their 'threshold'. Preliminary data from 200 volunteers shows a clear separation for threshold values between normal and those with neuropathy. The sensory organs in the fingers that detect Bumps are called Meissner's corpuscles. These are present in normal skin as illustrated in Fig 2.



The top layer of skin, called epidermis (blue) contains many thin nerve fibers (green) that detect painful sensations (heat and pin). The blood vessels and the boundary between the epidermis and the dermis (layers of skin under the epidermis) appear red. In neuropathic conditions, Meissner's corpuscles can be decreased or abnormal.



Fig 3: The SWEAT device

Fig 4: Pilocarpine through the skin

The **SWEAT** device (fig 3) is a camera that takes video of sweat as it comes out of sweat ducts. First we make a small area of skin sweat to its maximum. This is done using a drug called pilocarpine that is delivered through the skin (fig 4). Then we take video of the sweat which appears as small dots. These dots that enlarge over time give us an idea about the rate of sweating; this is a functional test for other types of nerve fibers called pseudomotor or secretomotor (fig 5).

The results of the test give us an idea of how well the nerves around sweat glands are functioning.

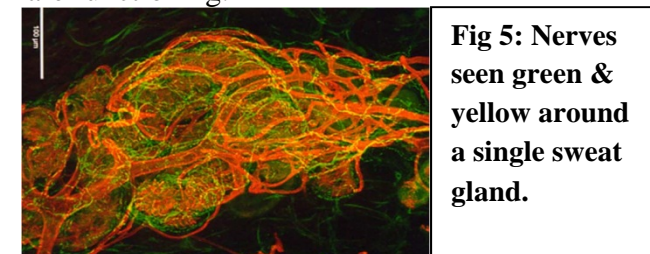


Fig 5: Nerves seen green & yellow around a single sweat gland.

Why Is This Important?

Early detection of neuropathy could lead to intervention at a time when the neuropathy could be slowed or even reversed. We can also monitor improvements of neuropathy with the introduction of potential new therapies.