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What Are These (Unusual) Images of Inner Ear Structures? A Picture Quiz.

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I have recently started to sort through hundreds of photo-micrographs accumulated during my decades of research studies. I have images taken with the light microscope (of various types) and images from electron-microscopes. Typically, in an anatomical study, the final paper will contain a few good representative images selected from the large pile of micrographs taken. However, I have come across interesting images that have not been central to the research studies and are not included in publications but are nevertheless interesting. Whilst I have ownership of these images, they were really shot by team members in my lab. For the images shown here, I want to credit lab technicians Richard Mount and Jaina Negandhi, and graduate trainee Mattia Carraro (PhD awarded in 2016).

Most of my research has been on the inner ear, so I've picked out three unusual images that, as audiologists, you might recognize or not. Perhaps we can make this a mystery game where you first look at the picture and try to identify the structure **before** reading my detailed description.

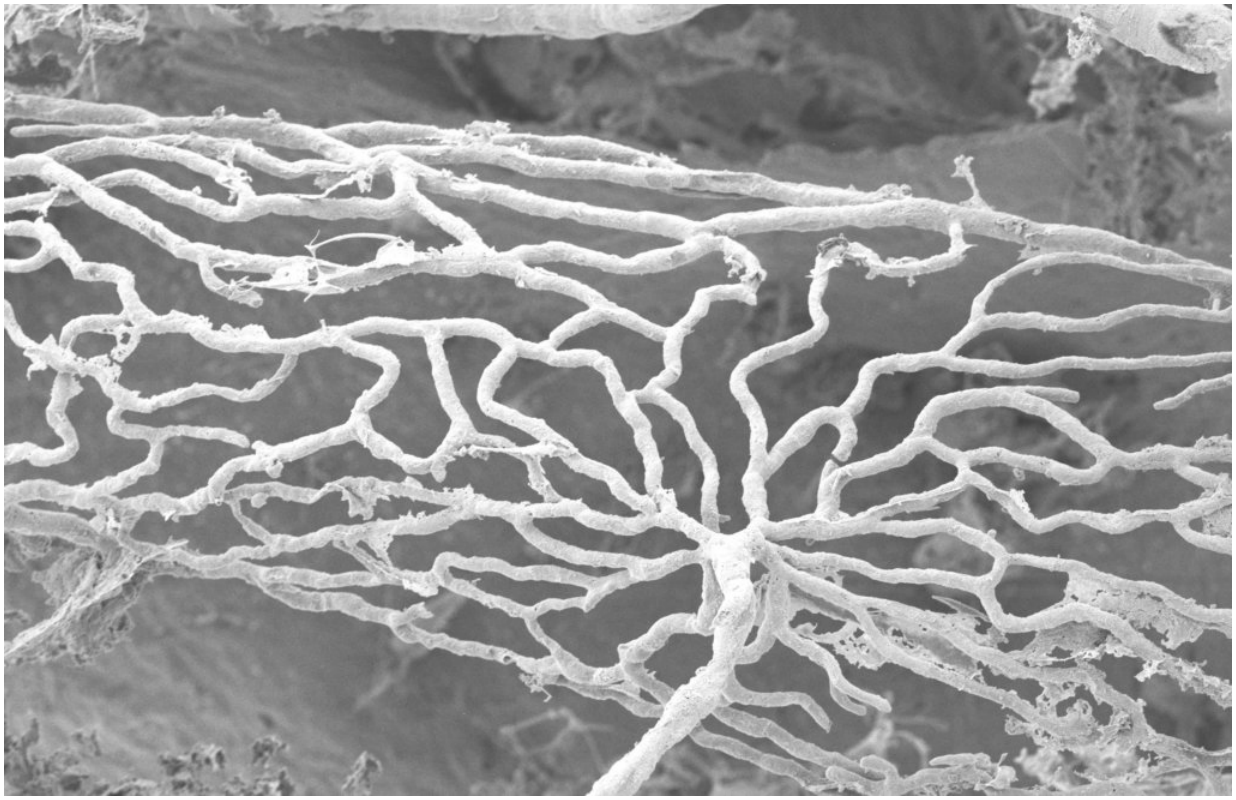

Figure 1 shows the capillaries from a section of the stria vascularis of the cochlea. The image shown was visualized using a scanning electron microscope. The specimen is not exactly of the capillaries but is a "corrosion cast" of the insides of the capillaries. To make this preparation a liquid polymer is

injected into inner ear blood vessels and then allowed to harden (i.e., polymerize). Then the biological tissue is corroded away leaving just the cast. This “fan-like” capillary arrangement ensures a well-distributed oxygen supply within the stria. Without this oxygen supply, there will be no generation of the endocochlear potential, the haircells will not operate, and a hearing loss will result.

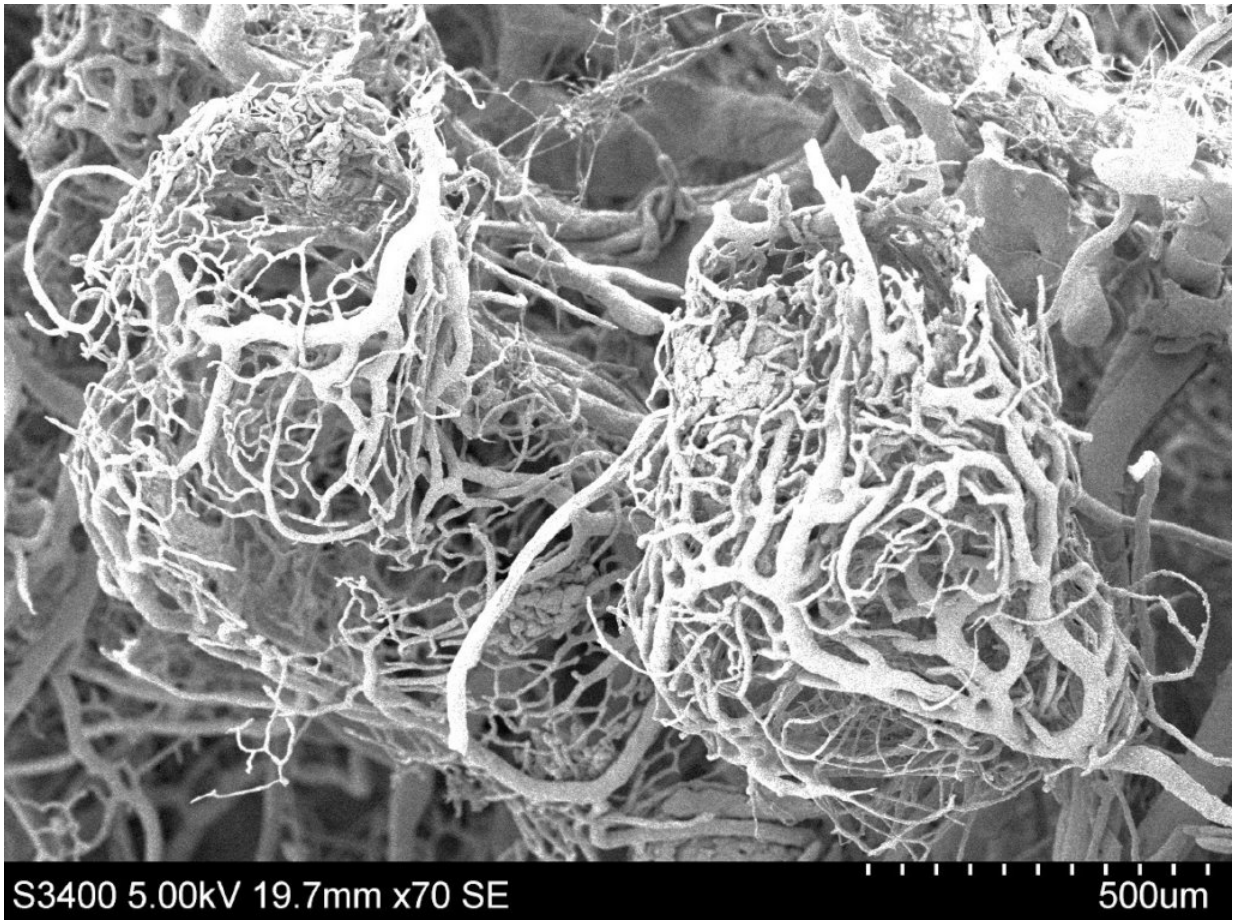

Figure 2 is also a “corrosion cast” image of blood capillaries, vessels surrounding two adjacent ampullas of the semicircular canals. Remember, what you see are the (insides of) capillaries that surround the vestibular organs. You do not see the ampulla or the parts of the semicircular canals because those tissues have been corroded (digested) away. We tend to forget that the cochlea and vestibular organs depend on a good oxygen supply to maintain the general life of the tissues and provide energy for vestibular and cochlear haircell transduction mechanisms. Therefore, we can regard these capillary beds around the vestibular organs as equivalent to the stria vascularis of the cochlea.

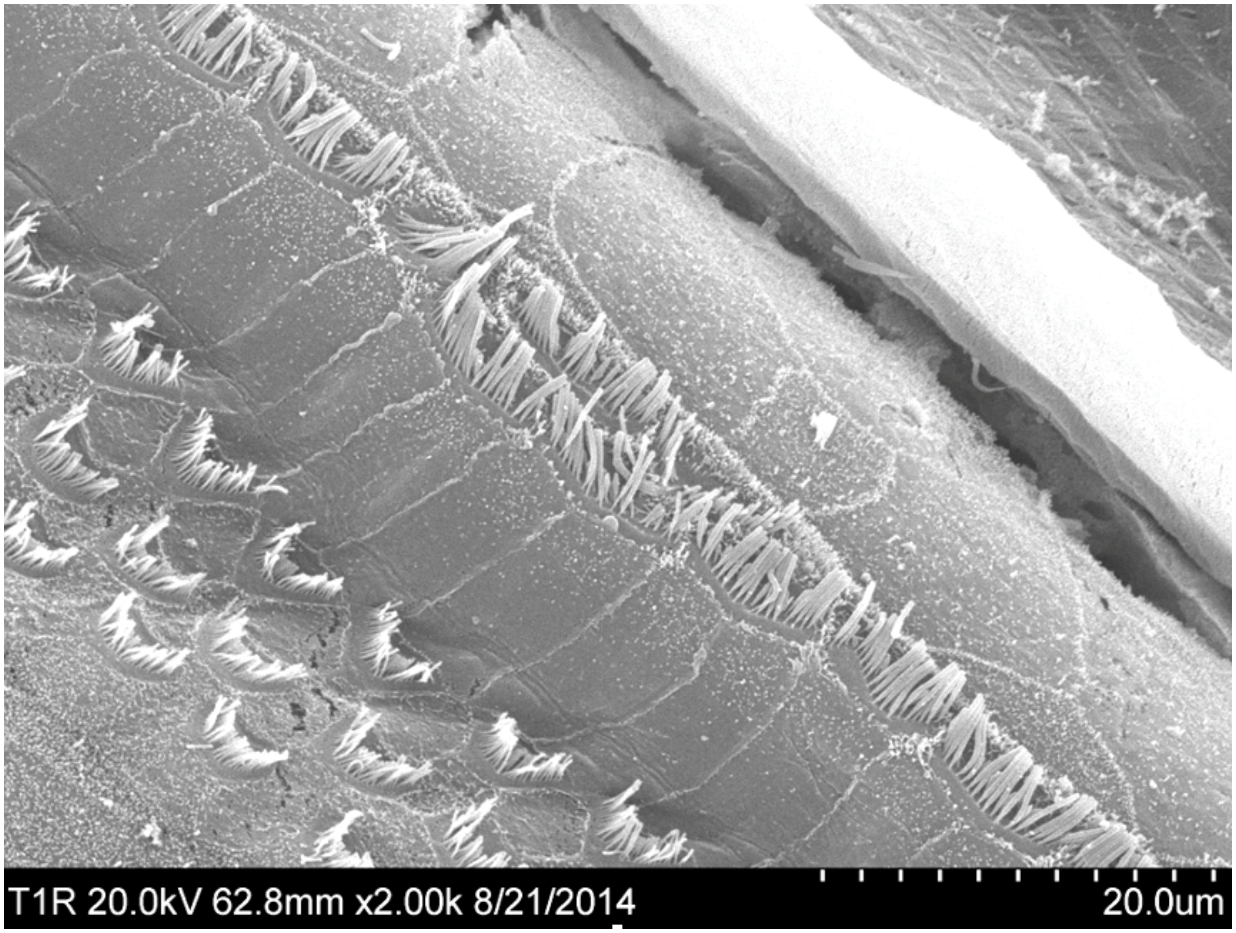

Image 3 is very unusual. It shows a doubling up of inner haircells. In the cochlea it is very common to find more than three rows of outer haircells (especially in the human where for four rows are not uncommon), but this finding of a double row of inner haircells is rare. What could be the functional consequence of this doubling up of haircells? Perhaps a narrow band acouphene?

I trust that you were close to being correct in identifying these images. Look out for more mystery picture quizzes in future issues of *Canadian Audiologist*.