3D Ultrasound Probes

Grace Lynch- Biomedical Engineering- University of Rhode Island

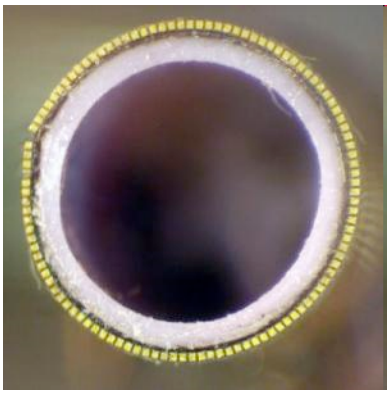
The 3D ultrasound probe is powerful enough to provide detailed, 3D images. The new device works like an insect's compound eye, blending images from 108 miniature transducers working together. It is small enough to ride along at the tip of a catheter will be able to provide physicians with clearer real-time images of soft tissue without the risks associated with conventional x-ray catheter guidance. These tiny transducers work together to create one large transducer, working much like the compound eyes of insects

Catheter-based procedures involve snaking instruments through blood vessels to perform various tasks, such as clearing arteries or placing stents, usually with the guidance of x-ray images. Currently, when maneuvering a catheter through a vessel, physicians rely on x-ray images taken from outside the body and displayed on a monitor to manipulate their instruments. Often, a contrast agent is injected into the bloodstream to highlight the vessel. While the images obtained this way are good, some patients experience adverse reactions to the contrast agent. A contrast agent is injected into the bloodstream to highlight the vessel. Also the images gained this way are fleeting. The 3-D ultrasound guidance does not use x-ray radiation or contrast agents, and the images are real-time and continuous.

A benefit is portability, which is an important issue for patients who are too sick to be transported, since x-rays need to be taken in specially equipped rooms. The 3-D ultrasound machine is on wheels and can be moved easily to a patient's room.

In a series of proof-of-principle experiments in a water tank using simulated vessels, the engineers used the new ultrasound probe to guide two specific procedures. The first was the placement of a filter within a vessel and the second was the placement of a synthetic "patch" for aortic aneurysms. The next step that they will take will be testing the probe on animals.

In



the first experiment, the new probe successfully guided the placement of a filter in a simulated vena cava, the large vein that carries deoxygenated blood from the lower extremities to the back to heart. Patients with clots in their legs – known as deep vein thrombosis – who cannot get clot-busting drugs often receive these filters to prevent the clots dislodging and traveling to the heart and lungs. The second experiment involved the placement of abdominal aorta aneurysm stent grafts, which are large synthetic "tubes" used to patch weakened areas of the aorta that are at risk of bursting.

References:

http://www.innovationsreport.de/html/berichte/medizintechnik/tiny_3_d_ultrasound_probe_guides_catheter_procedures_117222.html
http://www.analog-europe.com/news/210201751
http://www.healthimaging.com/content/view/11983/89/