

OmniSonic Medical Technologies Inc.
OmniWave™ Technology
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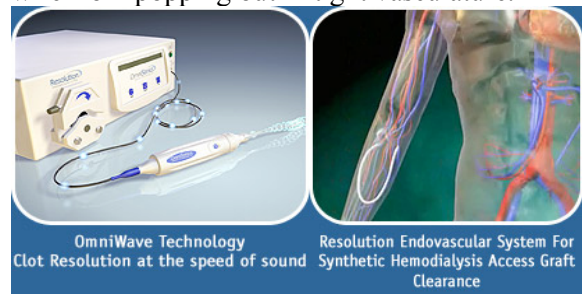
OmniSonic Medical Technologies (founded in 1998) is “a venture-backed medical device company focused on developing breakthrough products for the treatment of vascular occlusive disease. These products are based on the Company’s patented **OmniWave™ Technology**, the first technology that enables the delivery of therapeutic ultrasonic energy along the length of a small interventional wire. **OmniWave™ Technology** is designed to have broad applications in the peripheral and coronary vascular occlusive conditions, which afflict millions of people worldwide.”

Vascular occlusive disease is one of the leading vascular diseases in the U.S. Vascular occlusive disease is the result of “hardening of the arteries” causing poor circulation to the upper and lower extremities. It is most common in people over the age of 70 and leading factors range from smoking, diabetes, high blood pressure, high cholesterol levels, and advanced age. Current treatment includes a balloon angioplasty of the occluded vessel, with or without stent placement. In extreme cases, open bypass surgery is applied to the infected area. Low hemolysis levels are also a positive benefit of this device.

The **OmniWave™ Technology** is designed to break up these occlusions through ultrasonic technology. The surgeon is able to use a single device which involves a small generator and a handpiece. The handpiece is designed to have a long distal wire encased by a catheter. This catheter contains two lumens; one for injection /guide wire accessibility the other for the waveguide. Also, two distal markers allow for fluoroscopy to be used during surgery. The wire (or waveguide) is about the size of a standard guide wire and allows the ultrasonic energy to travel without damaging the vessel. “Low power ultrasonic energy is directed down the Resolution Therapeutic Wire that has been tuned to break the fibrin bonds, thereby dissolving thrombus.” If the clott is too dense and can not be broken up completely, a stent is used to

ensure that the vessel has continuous flow. Easy care and restoration of flow is primarily the two main focuses of this device.

The mechanics of this device includes a vast knowledge of acoustics, physics, and electrical design. The handpiece and generator run off of a .5 Power Factor ($PF = \cos \phi$). The handpiece uses ceramics that oscillate at frequencies around 40.1 kHz causing a wave to travel down the wire as a sine wave and is transposed as a standing wave. Thus this standing wave is what allows the wire to move around the vessel yet has such a low power output (ranging depending on the density of the clott 6- 11 W) that is won’t damage the vessel. The catheter, which is attached at the nose cone of the device, is heated to fuse to the most distal tip of the wire. Fusing the catheter to the wire prevents the wire from popping out in tight vasculature.



This small and upcoming company has allowed students, like me, to have hands on training through internships and CO-OP’s in various areas of engineering and preclinical science. FDA approval of this product is still in the making and should be out for a limited market release by mid October. All final designs have yet to be released. This device will change the face of the average occlusive procedure by cutting down surgical time and ensuring clean vessels.

References :

1. http://omnisonics.com/about_01.htm
2. <http://www.brighamandwomens.org/vascularsurgery/PeripheralVascular.aspx>
3. <http://www.medterms.com/script/main/art.asp?articlekey=3694>

