

*Biomedical Computation Review*

Simbios AN NIH NATIONAL CENTER FOR BIOMEDICAL COMPUTING

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## Visualizing Ventricular Fibrillation

**U**nsynchronized twitching of the heart's ventricles—known as ventricular fibrillation—kills about 300,000 Americans yearly. Its underlying cause: electrical spiral and scroll waves that propagate through the heart. Simulation and visualization are playing an important role in understanding that process.

In a novel approach to a review of the research, **Flavio Fenton, PhD**, and **Elizabeth Cherry, PhD**, research associates in biomedical sciences at Cornell University, simulated and visualized what's currently known about how electrical spiral waves propagate through the heart to cause tachycardia (rapid heart rate) and fibrillation. The work was published in the December 2008 Visualization in Physics focus issue of the *New Journal of Physics*. □

*Cherry and Fenton simulated electrical spiral waves through the three-dimensional heart. In the Java Applet of this 3-D simulation, we see a so-called "mother rotor" spiral wave on the front of the heart. Although this might suggest a single spiral wave that would cause only tachycardia (rapid heart beat), the 3-D heart can be rotated in the Java applet to show the breakup of the wave on the back of the ventricles—a sign that this heart would begin to quiver or twitch uncontrollably in fibrillation. When this happens, no blood gets pumped to the body or lungs.*

*Images reprinted with permission from EM Cherry and FH Fenton, Visualization of spiral and scroll waves in simulated and experimental cardiac tissue, New Journal of Physics 10 (2008) 125016, Figure 33d Java applet. Also visit <http://thevirtualheart.org>.*

