A Novel Approach to Improving Blood Circulation Using Complex Ultrasonic Wave-forms

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The scientist set out to develop a novel approach that improves on the commercially available ultrasonic circulatory therapy technology. The device was purchased and analyzed. It was found to produce a repeating single frequency square wave pulse/burst. In an effort to find a waveform that would better reduce viscosity of a liquid exposed to it, a new system that generates complex Bessel functions was developed. To achieve this, a digital to analog converter was attached to a Raspberry Pi. A D/A converter converts a digital signal to its analog counterpart capable of reproducing far more complex wave shapes than that of a single square pulse. A custom apparatus using plastic tubing, a peristaltic pump, and a pressure measuring gage was also engineered and used to measure the pressure of simulated blood pumping through it. The apparatus was then exposed to the standard ultrasound therapy system and the novel ultrasound Bessel function system for extended amounts of time. The two systems were compared resulting in a significantly better pressure reduction performance from the novel complex (Bessel) waveform system of approximately 28%. Due to regulations, no real blood or analogous organic material was used, and thus more formal testing would be required for this device to be used in the medical field with its infinite medical applications. The scientist has made a significant improvement in ultrasonic circulatory therapy systems and is currently applying for a utility patent to cover the novel system.

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