

Extracorporeal Pulse Activation Therapy (EPAT): Efficacy of Pressure Pulse Transmitters

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Introduction:

Extracorporeal Pulse Activation Therapy (EPAT) uses the therapeutic effect of radial pressure pulses or waves respectively generated by differently shaped transmitters.

These transmitters are used selectively for different indications.

Methods:

The energy emitted by different types of transmitters (DeepImpact, D-Actor, VActor, etc.) and its distribution within the body were measured by various methods (laser interferometer, pressure and force transducer) then analyzed. The two typical pressure pulses, released when the projectile accelerated by compressed air hits the transmitter, lie within two frequency bandwidths: 100Hz-10kHz and 80kHz-200kHz. The slower pressure pulse cannot be measured by pressure transducer within a laboratory setting using water as a tissue phantom. A more solid, visco-elastic material is needed. By comparison, the faster pressure pulse can be measured more easily by conventional methods used for shock waves.

Results:

The measurements show that the different penetration depths and radiation fields are dependent on transmitter shape, material and type of attachment within the hand piece.

Discussion: With regard to pressure pulse generation, it is typical to use the driving pressure for quantifying the energy level applied. A physical parameter describing the energy delivered to the tissue would be beneficial. Still, when considering both pulse types, the energy flux density might easily exceed the typical values used with shock waves and thus be considered confusing.

Conclusion:

Further scientific evaluation of the relationship between pressure pulse properties and their physiological effects within the tissue is necessary for a better understanding of the biological-physical interactions and for determining possible methods to extend and improve the treatment procedures.