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Critical Blood Pressure Ratio And Memory Effects Are Risk Factors For Stroke - Discovery Of Biofluid Choking A Paradigm Shift In The Diagnostics Sciences Of Hemorrhage And*Ischaemic Heart Disease*

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Abstract:
Introduction
Biofluid choking, a compressible fluid flow effect, occurs anywhere in the circulatory system including *vasa vasorum* when the blood/biofluid velocity is equal or above to the local velocity of sound. The choking and unchoking could occur due to the variations in the blood pressure-ratio (BPR) and blood/biofluid heat capacity ratio (BHCR). At the choked condition, BPR (SBP / DBP) is a unique function of BHCR (C_p/Cv).
Hypothesis
Abnormally high-pressure overshoot could happen in the downstream region of the choked-vessels due to shock waves leading to spontaneous tearing of vessel wall with *memory effects* (stroke history).
Methods
A model capable to predict the *lower critical hemorrhage index (LCHI)* correlating with BPR and BHCR is developed for forecasting the risk of stroke and myocardial infarction (MI) through *in silico* studies. Through *in vitro* studies *LCHI* is predicted for healthy subjects [age 23-56 / *Guinea pig*].
Results and Discussion
Using *aspirin* to reduce viscosity augment *Reynolds number*, which leads to high turbulence and enhanced boundary layer blockage creating an early undesirable *cavitation*, *choking* and *shock waves* in vessels with plaque and / or boundary-layer blockage (peak at winter). *Cavitation* is quite noisy and can be sufficiently violent to physically damage valves and blood vessels. *Memory effects* and transient pressure-spikes due to shock waves developed over the years in the choked blood-vessels create its walls stiffer and prone to rupture in the subsequent strokes.
Conclusions
Due to anisotropic properties of blood, suppressing the turbulence level and simultaneously reducing the blood viscosity in all directions are the key tasks for maintaining the unchoked flow condition for preventing stroke and MI which could be achieved through a single drug or a companion medicine along with *aspirin* capable to enhance BHCR. In conclusion for a healthy life BPR must always be lower than LCHI dictated by BHCR for prohibiting stroke and MI.