

RHEOLOGY OF BLOOD AND ITS VESSELS

Annex

BLOOD RHEOLOGY

Blood - Aggregation and Sedimentation of red cells - Non-Newtonian viscosity - viscoelasticity - Factors affecting blood viscosity- Plasma layer - Radial migration - Fahraeus effect, Fahraeus-Lindqvist effect - wall surface effect - Copley- Scott Blair phenomenon - Disturbed flows of red cell suspensions - Viscosity of blood clots.

RHEOLOGY OF BLOOD VESSELS

Blood vessel walls - Forces in blood vessel walls - General theory of circumferential tension - Stress distribution in blood vessel walls - Incremental theory of blood vessel walls - Nonlinear theory of elastic deformation - Tethering effect on the stresses in blood vessels - Some rheological models of blood vessels.

FLOW OF BLOOD

Steady flow of blood through stenosed arteries- Power-law fluid-Bingham-Plastic fluid-Casson fluid-Hershel-Blukley fluid- pressure - flow relationship. Pulsatile flow of Newtonian fluid.

TWO-LAYERED MODEL FOR FLOW OF BLOOD

Newtonian-Newtonian model for blood flow- Casson-Newtonian model for blood flow- Couple stress-Newtonian model for blood flow- Micropolar-Newtonian model for blood flow- Velocity profile- Pressure - flow relationship.

HEMORHEOLOGICAL ASPECTS OF CARDIOVASCULAR DISEASES

Flow in a locally constricted tube - Post-stenotic dilatation- Flow at branching sites - Thrombosis - Atherosclerosis - Protein uptake by arterial wall - Permeability and pathways of macromolecules - Physical theory of vascular permeability to proteins - Stresses in the arterial wall as a cause of permeability.

TEXT BOOKS :

1. Syoten Oka., Cardiovascular Hemorheology, Cambridge University press, London, 1981.
2. Y.C.Fung., Biomechanics : Its foundations and objectives, Prentice-Hall , 1973.
3. Arthur S.Lodge, Michael Renardy and John A.Nohel., Viscoelasticity and Rheology, Academic press, Inc. Newyork, 1985.
4. J.C.Misra, Biomathematics: Modeling and Simulation, World Scientific Publishing Company, 2006.

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