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82. *Dynamic and Stochastic Aspects of Leucocyte Distribution at Arteriole Branch Points*. R. RUBIN AND H. N. MAYROVITZ, Miami Heart Institute, 4701 North Meridian Avenue, Miami Beach, Fla. 33140.

The factors which determine the way in which leucocytes in a parent arteriole distribute to the arteriole's branches are unknown. Though theory and experimental data on erythrocytes and small microspheres suggest a distribution strongly dependent on the bulk blood flow ratio, sufficient experimental data on this point are lacking. The purpose of the present study was to systematically characterize the leucocyte flux into arteriolar branches, and determine the possible dependence of this flux on branch blood flow, diameter, and branching angles. Using the hamster cheek pouch preparation, a suitable arteriole branch point was selected and the number of leucocytes per unit time (flux) in the parent arteriole and its two branches were determined by rendering the leucocytes fluorescent by a constant intravenous infusion of acridine orange (50 μg/ml at 0.0086 ml/min). Data recording was done using an epi-illumination fluorescence microscope to which was fitted a low-light-level TV recording system. The recorded video information was then electronically processed to determine the leucocyte flux and the transit time of each cell over a known distance. The transit time data yielded the velocity of each leucocyte, and together with vessel diameter was used to estimate blood flow. Results to date have included measurements of a total of 3100 cells having velocities from 0.2 to 1.2 mm/sec in arterioles with diameters of 6.4 to 19.2 μm. Analysis of this preliminary data indicates that the simple concept of a flux ratio in the branches proportional to the bulk flow ratio is inadequate to account for the observed sequential flux pattern.

83. *Gravitational Viscometry*. A. H. SACKS, P. N. NORTH, AND M. W. BRADLEY, Institute for Medical Research, San Jose, Calif. 95128.

Gravity filtration tests of human blood have been carried out using a clear cylindrical tube standing vertically on a single filter element consisting of a glass capillary array with cylindrical pores 50 μm in diameter and 2 mm in length. Flow rates are reduced as desired with the use of a Parafilm template which is cut out to permit flow only through the desired number of pores. This experimental setup produces minimum wall shear stresses of the order of 1 dyn/cm^2 and offers a simple procedure which yields experimental data of column height vs time with essentially zero scatter. Because of the very uniform cylindrical pores in the glass array, these data lend themselves to the analysis of Metzner and Reed for very general non-Newtonian fluids. Mathematical expressions are therefore derived for apparent viscosity as a function of strain rate in terms of the experimental measurements of column height vs time. It is found that the experimental data are closely matched by the Casson equation (r^2=0.998) with a yield stress of about 0.02 dyn/cm^2 for normal human blood at 35% hematocrit. This result agrees approximately with values obtained by other experimental techniques. Agreement with rotary viscometer data for the same sample appears to be quite good when the correction of Barbee and Cokelet is used to determine the hematocrit in each pore of the capillary arrays. We conclude that gravitational viscometry using glass capillary arrays offers a simple inexpensive test with results for blood which are comparable with those of rotary viscometers under somewhat more realistic flow conditions.

84. *A New Method for Measurement of Hematocrit, Red Cell Flux, and Capillary Transit Time*. I. H. SARELIUS AND B. R. DULING, Department of Physiology, University of Virginia School of Medicine, Charlottesville, Va. 22908.

We have used fluorescently labelled erythrocytes in tracer quantities to measure microvessel hematocrit and erythrocyte velocity. The method is independent of *in vitro* calibrations, does not require extensive mathematical reduction, and can be applied to microvascular networks in any tissue. The technique also enables, for the first time, direct measurement of both microvascular red cell flux and erythrocyte transit time across the tissue. Microvessel hematocrit (H_{micro}), erythrocyte

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