Investigations on the Viscosity of Fixed Erythrocytes

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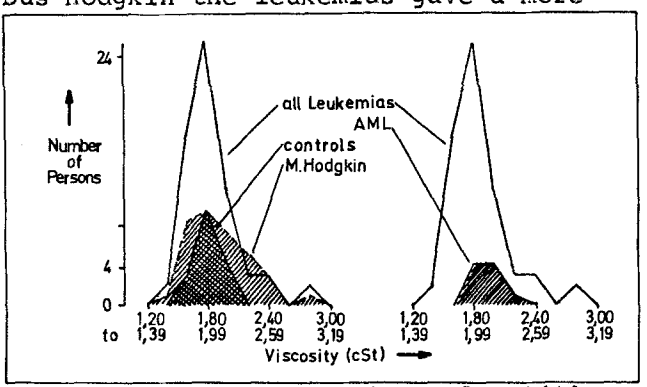
Using Ubbelohde capillary viscosimeters several types of human erythrocytes were investigated. The apparent kinematic viscosity was measured from Glutardialdehyde hardened red cells which had been taken from healthy, leukemic and Morbus Hodgkin donors. The following distributions have been received:

1. Number of persons/viscosity
Comparing healthy cells (control) with cells from patients with leukemia and Morbus Hodgkin the leukemias gave a more diffuse distribution while the controls concentrated within a small interval of viscosity. Morbus Hodgkin diagram had a similar shape to leukemia, but in addition showed a skewed distribution. Discrimination of the leukemias into 4 groups (acute lymphoblastic, acute myeloblastic, chronic lymphocytic, and chronic myelocytic) evolved higher viscosities only for the acute myeloblastic.



2. Number of persons/mean cell volume (MCV)
The cells of each sample have been counted under light microscope. From this number and packed cell volume the MCV had been deduced. Leukemia and Morbus Hodgkin cell volume showed a shift towards smaller cell volumes.

3. Viscosity/mean cell volume
Increased viscosity and increased MCV were always observed together. The viscosity-MCV-diagram showed a good linear relation between both parameters. Control, leukemia, and Morbus Hodgkin cells could hardly be distinguished by the slope of viscosity-MCV-plots.

4. Viscosity per MCV/echinocyte concentrations in M.Hodgkin suspensions
M.Hodgkin cell suspensions contained up to 30% echinocytes. Between viscosity and echinocyte concentration of the same sample a clear relation does not exist. To exclude the influence of the MCV to the viscosity the quotient viscosity per MCV was brought in relation to the percentage of echinocytes. The plot yielded a decrease of the quotient when the echinocyte concentration was increasing. The quotient approaches nearly asymptotically the control quotient. If no echinocytes are found in a M.Hodgkin sample this can be readily distinguished from controls by their quotient viscosity per MCV.