

SV-10 Sine-Wave Vibro Viscometer
Technical Note

Blood Viscosity Measurement

The SV-10 customer base includes researchers and doctors in Taiwan, USA and Japan measuring human blood viscosity.

The product was sold recently to a clinical doctor in Tokyo, having dialytic patients and desiring to measure the blood viscosity before and after artificial dialysis. The SV-10 proved capable of measuring the change of blood viscosity between 3.0 mPa.s and 2.6 mPa.s with a small sample volume, in a short span of time and with a superior repeatability.

Another example of blood viscosity measurement by SV-10 came from Dr. Oda at Hospital of Ryukyu University, Japan. The blood viscosity has been conventionally measured by capillary method, which takes time for preparation before measurement and cleaning after measurement. The SV-10 can address these difficulties of blood measurement by the following features :

- Low viscosity measurement from 0.3 mPa.s (Bear in mind that the blood viscosity ranges from 2 to 3 mPa.s)
- Temperature measurement by increments of 0.1 degree C (Blood temperature ranges from 32 to 40 degree C)
- Small sample volume from 10ml
- Easy cleaning of sensor plates
- WinCT-Viscosity software (This allows data export to a PC and real-time graphic display on a PC monitor)



Interview with Dr. Oda, Ryukyu University, Okinawa

The action of blood protein and platelet in the fibrinogen and prothrombin, which are ingredients of blood, reportedly cause blood coagulation or clots.

When too much of the above coagulant gets produced, the brain's blood vessels become blocked. This is called cerebral thrombosis, hemorrhage, etc.

Also, each internal organ becomes over-burdened. When the blood viscosity gets high, a lot of problems will occur due to the slow transmission of oxygen and nutrients.

We call such high blood viscosity "hyper viscosity".

Blood coagulation is caused by a steep increase in blood platelet and coagulation factors. To cope with such problems, controlling blood plasma exchange or plasma cure in the dialysis circulation system exists.

During the process of plasma exchange in the dialysis system, measuring the pseudo and real blood viscosity is indispensable to controlling and finding out how much plasma exchange must be implemented and optimize values as to the related factors.



A&D Company, Ltd.
Tokyo, Japan

Our study involves extracting blood plasma from blood plasma exchange in the dialysis circulation and measuring the viscosity. Viscosity in this case is the absolute viscosity obtained from just extracted plasma, not viscosity changes measured over time.

The extracted blood plasma is discarded after the viscosity measuring and the amount of the sample is not important.

Doctors are researching the relationship that exists between patients' condition, blood analysis and acquired data. This ideal or optimized viscosity data is measured and analyzed; the blood plasma exchange can be smoothly and properly implemented in the dialysis circulation system.

This blood plasma exchange is implemented by the artificial dialysis circulation system. Major manufacturers of such dialyzers here in Japan are Toray (Toray Medical) and Nikki-So.

The artificial dialysis system circulation research consists of flowing pseudo blood into hollow fiber membranes in the system and measuring the viscosity of the pseudo blood flown in/out of the dialysis circulation.

Further information on this research is undisclosed.

For the pseudo blood, viscous material is mixed with water to produce a liquid with the same viscosity as real blood. Then, this pseudo blood is flowed into artificial dialysis system circulation.

Then the viscosity of the pseudo blood obtained out of dialysis circulation is measured.

Measuring the viscosity can perhaps help to evaluate the hollow fiber membrane technology, too.

Tuning-fork

Vibration Method

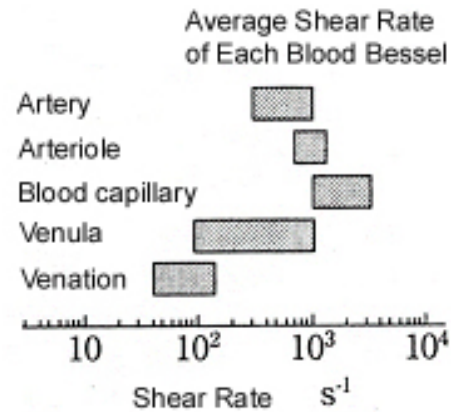
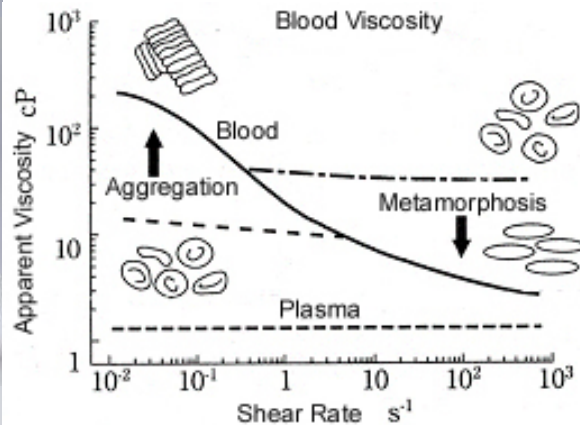
Viscometer

Sine-wave Vibro Viscometer

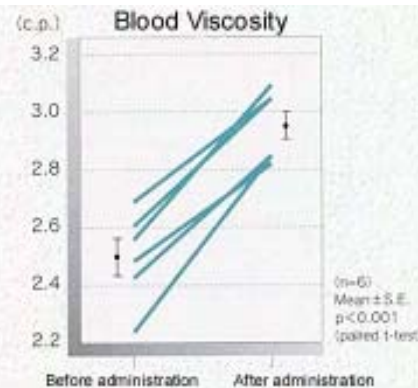
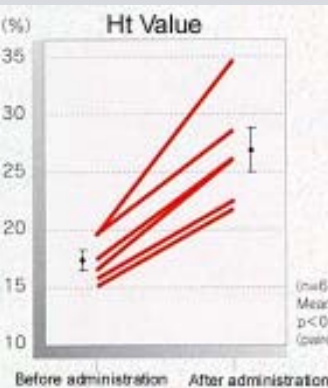
Easily measures viscosity of blood (whole blood), plasma, gastrointestinal fluid, etc. in short time

Useful in evaluating preservation and control of circulatory dynamics from the aspect of viscosity (consistency)

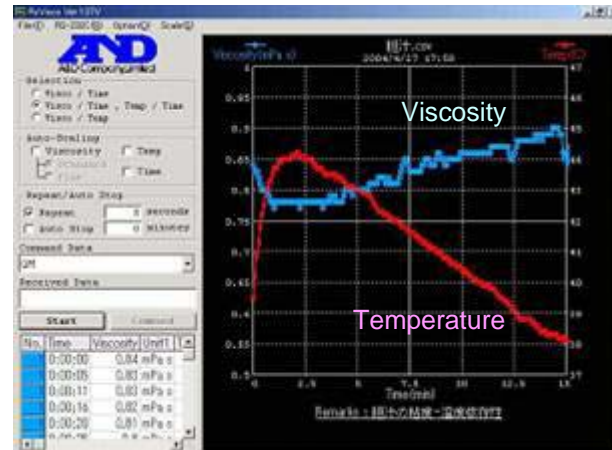
- Prevention and control of hyper viscosity
- Effect and evaluation of blood clotting inhibitor
- Effect and evaluation of erythropoietin preparation
- Evaluation of diabetes and blood viscosity
- Evaluation and control of circulatory dynamics



(Transcription from Non-Newtonian and Bloodstream of Blood, Japanese Society of Biorheology journal Vol18, No1:3-11, 2004 by Shinji Maeda) (Translation)



Epogin® (erythropoietin preparation) Epogin® (erythropoietin preparation)
 (Kurihara, et al.: Society for dialysis journal 22(7):733,1989) (Transcription from Renal Anemia During Dialysis, During CAPD, and Before Dialysis Introduction: (clinical data on Epogin®), Dec. 2003, by Chugai Pharmaceutical Co., Ltd.) (Translation)



Bile Viscosity – Temperature Relativity

