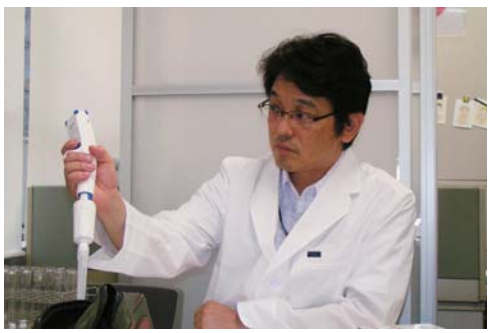
A&D Company, Limited

Interview with

Showa University School of Pharmacy Pharmacy Laboratory

"We want to measure the viscosity of suspensions[1] for research on 'easy to swallow' medicine that anyone can readily prepare."



A&D SV-A Tuning Fork Vibro Viscometer

Japan is a super-aged society and is facing a variety of challenges in health and long-term care. This includes the act of swallowing medication which may be difficult for the elderly.

Professor Tsutomu Harada of the Showa University School of Pharmacy uses the school's founding principle of consistent sincerity in his approach to research on easy to swallow medicine.
We talked to him about his use of A&D's Tuning Fork Vibro Viscometer for research on reducing the risk of aspiration[2] with jelly-like supplemental food.

◆ Showa University School of Pharmacy
Pharmacotherapy course
Tsutomu Harada, School of Pharmacy
Associate Professor of Pharmacology

◆ Pharmaceutical science 4th year student
Kanako Yoshie

It is as much the goal of pharmacology to make medicine that is easy to swallow as it is to enhance the medicinal effect

Please tell us what got you started in the science of easy to swallow medicine.

Prof. Harada: In Japan the compliance rate of people taking medicine prescribed by a doctor for chronic diseases is said to be about 50%. This means that half of the drugs bought at pharmacies are not taken according to the recommended usage. This may be due in part to misinformation on the Internet and the media as well as to error by the patient but difficulty swallowing is also a cause.

50% is quite a surprising number...

Prof. Harada: I believe it is as much the goal of pharmacology to make medicine that is easy to swallow as it is to enhance the medicinal effect. This is especially true for the elderly and small children. Tablets and powdered medicine are not satisfactory. Rather a semi-solid medicine more suitable.

Such medication already exists, doesn't it?

Kanako: It does. Although there are only a few medicines that are in jelly form, a method of dissolving a thickening agent in water and preparing[3] tablets and capsules into jelly-like substances appears to be gaining popularity at nursing care sites. However, it is difficult to reach the correct thickness or viscosity and when prepared incorrectly the efficacy of the medicine can be negatively impacted.

So the viscosity of the medicine can cause it to lose effectiveness?

Kanako: When the viscosity is not just right it can become runny like water or lumpy like tapioca. In those cases research is revealing there is the risk that the effectiveness of the medicine is less than half and can dip as low as 20%. This information is also surprisingly not well understood by pharmacists.

With rotational viscometers[4], measurement of low viscosity suspensions is difficult. This is not a problem for the tuning fork vibro viscometer[5]!

What must be done to ensure the expected viscosity?

Prof. Harada: The key points to reaching the proper viscosity are the concentration of the thickening agent and temperature control. In our experiments, the water jacket temperature is set to human body temperature of 37 °C and near room temperature at 20 °C. Luckily, A&D's SV-A tuning fork vibro viscometer makes temperature control and management easy and reduces test time compared to rotating type viscometers.

Kanako: The samples we measure have an uneven distribution of watery and viscous parts. This makes rotations unstable during the measurement with rotational devices reducing accuracy. The tuning fork device can measure viscosity instantly which is very advantageous.

Kanako operating the BM series, the A&D analytical balance with built-in ionizer

Prof. Harada: We nearly gave up after trying to measure the viscosity of suspensions of medicine with rotational devices. Measuring the viscosity of samples with uneven dispersion, especially low-viscosity samples was impossible. However, by using A&D's tuning fork device, we were able to quantify the minor differences in low-viscosity suspensions that we weren't able to do with the conventional device. I believe it is important to use a number when informing medical caregivers that a method is safe for medical administration.

How will such a number be used?

Kanako: We want to be able to express sensory differences like jam-like or yogurt-like consistencies with an easy to understand number to inform caregivers that patients can safely take a medicine.

Prof. Harada: The final goal of this research is to ensure that anyone in health care and caregiving services can easily prepare medicine to the appropriate thickness without having to worry about the details.

Kanako: When I entered this school I had a vague feeling of wanting to become a pharmacist. However, after becoming involved with this research I have become more motivated to develop friendlier medication to help even the slightest patient suffering. All thanks to Dr. Harada (laughs).

Happiness is the most important thing to measure. Quantifying pain as a number would be helpful for this.

Prof. Harada: Artificial intelligence and robots will become more common in the future. What can the average person do in such a situation? Only humans can understand human happiness. If this degree of happiness can be measured and input into an artificial intelligence or robot they will become even better tools for humanity. Because of this the thing I want to measure most is human happiness.

Kanako: It would be good if we could quantify pain as a number. Because removing pain is directly connected to happiness.

Prof. Harada: I wonder if devices that measure happiness are on A&D's development horizon? (laughs)

We would like to thank Showa University for taking the time to do this interview.

(Interviewer: A&D Company, Limited Sales Promotion Division)

Note 1: Suspension: Solid particles dispersed in a liquid state.

Note 2: Aspiration: Sucking food, drink or saliva into the airway by accident

Note 3: Preparation: Ensuring a sample is made according to rules and requirements. Term used for substances such as solutions and mixtures.

Note 4: Rotational viscometer: A device that measures the viscosity of a liquid using the rotational method. A detector probe inside the device is rotated and the torque acting on the rotating element is measured.

Note 5: Tuning fork vibro viscometer: A device that measures the viscosity of a liquid using a tuning fork. Viscosity is measured from the electromagnetic force required to keep the amplitude constant while resonating at a constant frequency.

Cooperation

Showa University School of Pharmacy Pharmacy Laboratory

Location	1-5-8 Hatanodai Shinagawa-ku Tokyo
College established	1946
College of Pharmacy established	1964
Students	1,183 (As of May 1, 2016)

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