Multimedia Teaching Material Data Base System Aiming at the Understanding and Application of Drug Interactions

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Intention of its Development

It is a relatively recent phenomenon in Japanese pharmcy education that emphasis is being placed on teaching the knowledge which will be immediately required by the pharmacists when they start working in the clinical setting. How such education should be conducted is controversial. It is needless to say that education adapted to the clinical setting is important; however, in view of the long-term goal of nurturing pharmacists who have the ability to apply their knowledge to clinical practice, producing pharmacists who can utilize the basic concepts of pharmacy in the clinical scene is considered to be the largest problem.

One of the important tasks of pharmacists in the administration of drugs to patients is the checking of drug interactions. This is because a drug described in a prescription may interact with other drugs administered to the same patient, greatly changing the drug efficacy or causing adverse drug reactions. If pharmacists remember drug interactions only by the combinations of drug names, it is impossible to predict the interactions between new drugs by applying their knowledge in the actual clinical scene, where new drugs are constantly appearing. Pharmacists must firmly acquire the basic concepts concerning drug interactions.

It is under these circumstances that the Study Committee for Education of Pharmaceutical Information of Japan Universities Association for Computer Education plans to prepare the titled data base as a teaching-supporting system for the education of drug interactions.

Constitution of the Data Base System

The data base system, the preparation of which is being planned, consists of 4 parts: drug-interaction mechanisms; simulation of drug concentrations in blood; drug-interaction

data base; and problematic prescriptions. The respective parts can be utilized separately and also utilized in association with each other.

The part regarding drug-interaction mechanisms is a classification of drug interactions and a compilation of teaching materials which facilitate the understanding of drug interactions visually by use of animation.

In the part regarding simulation of drug concentrations in blood, visual teaching materials for understanding how the pharmacokinetic parameters which have changed by drug interaction affect drug concentrations in the blood are presented.

The drug-interaction data base can be used to check whether or not an actual prescription contains drugs which may cause serious drug interactions. When two drugs are selected from a list and there is a drug interaction between them, it will be displayed, together with what kinds of problems occur and how the drug concentrations in blood will change. For their mechanisms, animation and simulation teaching materials, if available, are cited as references. Although drugs described as “concomitant use contraindicated” in the Drugs in Japan are used as data, we plan to extend our data base to drugs described as “concomitant use with care.”

Problematic prescriptions are a data collection for students which will enable them to examine the presence of drug interactions using actual prescriptions. A prescription can be selected from a list of prescriptions and a list of drugs. First, only a prescription is displayed. When Problem is clicked, the problems of the prescription are displayed. Then, when Solution is clicked, the method of solving the problem is displayed.

Animation for Deeper Understanding

For the drug-interaction mechanisms, animation is utilized to facilitate understanding of them. Figure 1 shows that in the binding of blood protein with drugs, when a drug with a stronger binding ability is presented, the drug already bound is discharged into the bloodstream, resulting in elevation of the concentration and excessive drug efficacy.

By simulation, it is shown that Drug A, shown as by red circles, discharges Drug B, shown as by blue circles, and Drug B released permeates the cell wall to move to a drug efficacy site. As compared to simply explaining by use of words, animation enables students to visually understand what actually occurs so that it has a stronger impact and is more impressive, leading to deeper understanding.

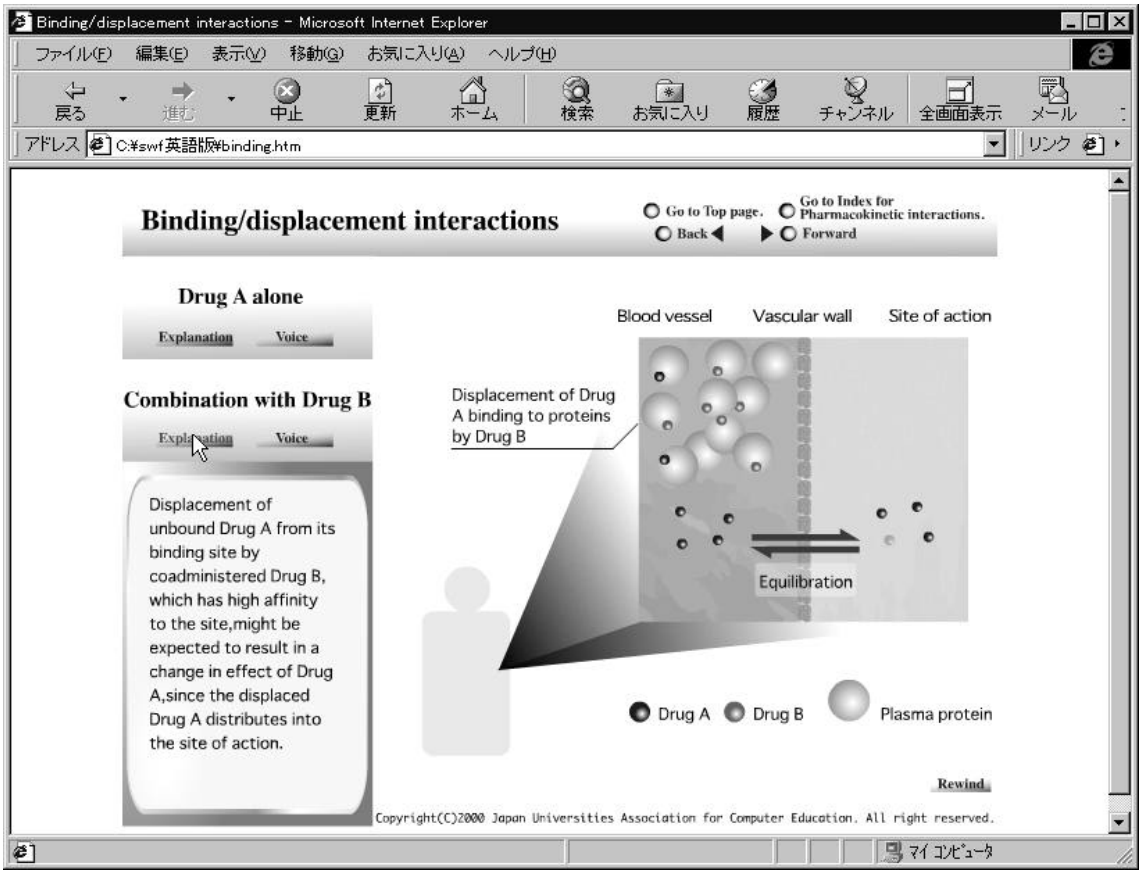

Fig.1　Binding/displacement interaction

Future Development

Since this data base is still under development, it has not yet been utilized in actual lessons.　However, we plan to use this data base in our educational curriculum as follows.

First, in a class of basic pharmacy, the data base including animation shall be shown as OHP materials to students in lectures of drug interactions.　In a class of drug therapy, an application subject, the drug-interaction data base shall be used in a hands-on setting**.**　In addition, in seminar classes, actual techniques for checking drug interactions shall be learned by referring to the prescriptions contained in the prescription collection.

It is considered that, using the same data base both in basic classes and application classes, it will become easier to understand how the basic concepts are utilized in the actual clinical scene.　In addition, we hope that by improving upon this data base, pharmacists already in practice will be able to utilize this teaching material to further deepen their knowledge of drug interactions.