Personalized Medicine Using Blood Concentration and Biomarkers

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It is well known that there are many inter individual differences when one drug was administered in same dose, because of the inter individual variation of pharmacokinetics pharmacodynamics（ＰＫ／ＰＤ）. In order to optimize the drug therapy, blood concentration of drug was introduced in clinical use from 30 years ago. Then, therapeutic drug monitoring(TDM) using blood concentration of drugs became a useful tool for the personalized medicine in many clinical fields. Population pharmacokinetics helped the development of TDM. Recently, many biomarker such as genetic factors and proteomics data were used for the optimization of drug therapy. Imaging data by positron emission tomography(PET) is also introduced for optimization of drug selection.

There are roughly 10 million positions in the human genome that vary among individual, and now the sequence of human genome is almost complete. However, the functional information about these genomic variations is poor. Many kinds of drug metabolic enzymes, drug transporters, drug receptors show different functions caused by genomic polymorphism. Thus, genetic information became important to reduce inter individual variation of drug efficacy, resulting in advance of
personalized medicine. It was demonstrated that heterozygous somatic mutation of enzyme, transporter and receptor are strongly associated with response to some drugs in some patients.

Proteomics data also became important for personalized medicine, although technical difficulties are remained. These biomarkers will contribute to the advance of personalized medicine in sophisticated drug therapy.

The future of personalized medicine supported by genetic data, proteomics data will be discussed.