TDM for cardiovascular drugs

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Scope of the lecture:
TDM for cardiovascular drugs including digoxin and antiarrhythmic drugs

Learning objectives:
1. To recognize the role of blood drug concentration monitoring of cardiovascular drug
2. To recognize the limitations of blood drug concentration monitoring of cardiovascular drug
3. To recognize the safety of antiarrhythmic therapy

Extended abstract:
The principle of pharmacotherapy is maximizing the pharmacological effect while minimizing adverse reactions. Therapeutic drug monitoring (TDM) is a strategy to individualize drug treatment through monitoring various factors that affect the efficacy and adverse effects of drugs. Antiarrhythmic drugs have long been investigated for their pharmacokinetic behaviors in the body and efficacy, and are used in the clinical setting on the basis of TDM findings. Blood concentrations of antiarrhythmic drugs should be interpreted according to not only expertise in pharmacokinetics, pharmacodynamics, and drug interactions, but also patient adherence to treatment. However, it is unclear whether TDM of antiarrhythmic drugs may improve the clinical outcome of patients with arrhythmia.

The effects of antiarrhythmic drugs cannot be predicted based only on their blood concentrations. The dosage regimen of antiarrhythmic drugs should be determined comprehensively according to the patient's signs and symptoms, ECG findings, and results of exercise testing, among other findings indicating the response of the drugs. The dose should not be set only to achieve the therapeutic range.

Recently, TDM is increasingly being expected to play a role as a safety index especially in the pharmacotherapy of cardiovascular diseases such as arrhythmia and heart failure.

Drug effects are affected by a variety of factors such as age, gender, genetic differences, environmental factors, meals, life styles, underlying diseases, and drug interactions. Blood concentrations of renally excreted drugs, i.e., drugs with high urinary concentrations of the unchanged drug, are prone to be affected easily by changes in renal function. On the other hand, blood concentrations of hepatically eliminated drugs (hepatically metabolized drugs) are affected by individual differences in the activity of drug-metabolizing enzymes.

Confirming the range of blood drug concentrations appropriate for each patient helps physicians prescribe the drug at an optimal dose and thereby avoid adverse drug reactions (ADRs).

In addition to conventional monitoring, TDM is a beneficial monitoring in ensuring the safety of cardiovascular drug therapy.