The genetics of personalized medicine

Learning outcome objectives
Upon successful completion of this lesson, you should be able to:
1. Discuss the biological concepts behind genetic differences and informational errors.
2. Explain the relationship between informational errors and drug therapy/disease diagnosis.
3. Apply genetic information to drug therapy and disease diagnosis.
4. Describe the concepts involved in the elucidation and application of biomarkers in drug therapy and disease diagnosis.
5. Explain the concept of single nucleotide polymorphisms (SNPs) as biomarkers of disease diagnosis and therapy.
6. Discuss the concept of SNP discrimination and detection and the technologies involved.
7. Apply genotyping technologies to drug therapy decisions and disease diagnosis.
8. Discuss the concept of microarrays (the gene chip) and their application to biomarker discovery and analysis.
9. Apply microarray technology to drug therapy and disease diagnosis.
10. Explain the concept of information transfer in drug therapy for cancer.
11. Apply molecular biological techniques to the therapy of acute lymphoblastic leukemia.
12. Relate the biochemistry of mercaptopurine therapy to drug toxicity.
13. Extrapolate the molecular biology of 6-mercaptopurine (6MP) therapy of acute lymphoblastic leukemia to drug therapy for other diseases.
14. Relate genetic information on cytochrome P450 drug metabolism to toxicity and efficacy of drug therapy.
15. Extrapolate the pharmacogenetics of cytochrome P450 metabolism to other mechanisms of drug metabolism.

Note: Students may find it helpful to complete the lesson in this series entitled “The molecular biology of personalized medicine” before completing this lesson.

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Ron Reid obtained a Bachelor of Science in Pharmacy from the University of Saskatchewan in 1969 and a Ph.D. in medicinal chemistry from Chelsea College of Pharmacy, University of London (England), in 1972. He undertook postdoctoral studies in genetics at the Institut für Genetics, University of Köln, Germany from 1972-76, followed by postdoctoral studies in protein/peptide chemistry at the University of Alberta from 1976-82. He was a professor of medicinal chemistry at the University of Manitoba (1982-90) before moving to the University of British Columbia (UBC) (1990-present), where he is a professor in biomolecular and pharmaceutical chemistry.

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