* Pharmacogenomics
* Dr. Naser Ashraf
* Learning objectives
* Define Pharmacogenomics
* Discuss drug polymorphism
* Explain the clinical relevance of Pharmacogenomics
* **Pharmacogenetics VS. Pharmacogenomics
Definitions**
* *Pharmacogenetics:* Study of inherited variation in drug metabolism and response determined by single genes.
* *Pharmacogenomics:* General study of many different genes that determine drug behaviour
* Gene
* *Genes* are the fundamental units of heredity
* They consist of ordered sequences of nucleotides located in particular positions in a particular DNA strand
* Variations in genes
* Monogenic: due to variation at a single gene
* Polygenic: due to variations at two or more genes
* Polymorphic: frequently occurring monogenic variants occurring at a frequency >1% population
* Single nucleotide polymorphism (SNP) most common type of genetic variation
* **Single nucleotide polymorphisms (SNPs)**
* Single base mutation which substitutes one nucleotide for another

**--**Single nucleotide polymorphisms (SNPs)

* For example a SNP might change the DNA sequence
* AAGCTTAC
to ATGCTTAC

* Drug polymorphism
* Variations in enzymes of drug metabolism
* Cytochrome Oxidase P450 Enzymes
* 57 Different active genes
* Different families 1,2,3
* CYP1, CYP2 and CYP3 are primarily involved in drug metabolism.
* CYP2A6, CYP2B6, CYP2C9 ,CYP2C19, CYP2D6, CYP2E1 and CYP3A4 are responsible for metabolizing most clinically important drugs
* Effect of Metabolic Rate on Drug Dosage
* Metabolism of 6-MP
* Pharmacogenetics: A Case Study
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* A genetically polymorphic phase II enzyme, N-acetyltransferase 2 (NAT2), catalyzes the acetylation of isoniazid.
* Variations in the enzymatic hydrolysis of the short-acting muscle relaxant succinylcholine by the enzyme butyrylcholinesterase (BChE)
* Codeine converted by CYP2D6\* to morphine
* Warfarin Levels Depend on Enzyme – CYP2C9
* Clinical relevance of Pharmacogenomics
* Knowing the frequency of pharmacogenomic variants in a given population can be helpful in prescribing
* Can reduce the rate of treatment failure
* Decrease the incidence of adverse effects
* Correct dose of a drug can be given depending on genotype
* Drug therapy can be individualized
* Polymorphism (Variation) in drug targets
* Identification of pharmacogenetic variants
* IMAGINE
* Patient will be entering into the clinic with “Data card” encoded with the sequence of it’s genome.
* On the basis of patient’s genetic information doctor will be prescribing the right drug in right dosage at the right time to effectively treat the condition.
* {Making the patient and the doctor free from the fear whether the treatment will work effectively or not.}