# October 2014 Health Notes by Evelyn Ames  Medications in Older Adults

Medications, be they prescriptions by medical personnel or over-the-counter drugs, are taken by people age 65 and older more than any other age group in the US. Older people as a group tend to have more long-term, chronic illnesses such as arthritis, diabetes, high blood pressure, and heart disease. (http://www.nia.nih.gov/newsroom/2004/12/innovative-website-helps-seniors-take-medicines-safely) Medications no doubt improve the quality of life for older adults but the elderly are especially at risk for medication-related problems due to physiological changes that affect absorption, metabolism, and elimination of medications.

"Over the last decade the percentage of Americans who took at least one prescription drug in the past month increased by 10%. The use of multiple prescription drugs increased by 20% and the use of five or more drugs increased by 70%." "Women were more likely to use prescription drugs than were men." Those who were without a regular place for health care, health insurance, or prescription drug benefit were less likely to have used prescription medication compared with their counterparts." (http://www.cdc.gov/nchs/data/databriefs/db42.htm).

Once medicines enter the body (for example, orally through a pill, a skin patch, an inhaler, or a **hypodermic needle), absorption occurs and drug distribution (that is, where the drug goes after** entering the blood stream) occurs. "Aging influences every aspect of physiologic drug processing. While the absorption of oral medications from the GI tract remains relatively constant in the absence of disease states and gastric pH altering medications, bioavailability and clearance dramatically change with aging. These changes become the most pronounced after age 75, when kidney and liver function become limited." "The aging process can have a significant effect on how a drug is distributed in the body. As the body ages, muscle mass declines and the proportion of body fat increases; therefore, drugs that are fat soluble will, in general, have a greater volume of distribution in an older person compared with a young person, but for drugs distributed in muscle tissue, the volume of distribution may be reduced." "This increase in body fat expands the volume of distribution for lipophilic drugs and also decreases the volume of distribution for hydrophilic drugs. The result is that water-soluble medications have an elevated active serum concentration, and lipid-soluble agents, while they may have a decreased serum concentration, have a prolonged half-life." http://www.the-hospitalist.org/details/article/234051/Drugs_and_the_Elderly.html and http://nihseniorhealth.gov/takingmedicines/drugsinthebody/01.html

Metabolism is the chemical alternation of a medicine by the body. Generally medications taken orally go to the stomach and small intestine and then to the liver where metabolism takes place. Various enzymes break drugs down and usually convert them into metabolites). "These metabolites are not usually as strong as the original drug, but sometimes they can have effects that are stronger than the original drug. For example, codeine in the prescription pain killer Tylenol#3 becomes fully active only after the medicine is metabolized in the liver." The liver acts as a "detoxifying" organ. "As such, the liver can be prone to damage caused by too much medicine in the body. Drug metabolites often return to the liver and are chemically altered once again before they exit the body." http://nihseniorhealth.gov/takingmedicines/drugsinthebody/01.html

Elimination of medications: "Elimination of drugs from the body occurs primarily via renal excretion. As with metabolism, the half-life of drugs is increased as renal function is reduced. As the body ages, renal function declines, sometimes by a significant degree. This decline is the

result of several physiological changes, which include a reduction in blood flow to the kidneys, a decrease in kidney mass, and a reduction in the size and number of functioning nephrons. Unlike hepatic effects, these changes are consistent from one patient to another." "The impact of renal elimination of medications cannot be overstated. Many drugs are completely or partially excreted by the kidneys. Other drugs are metabolized (sometimes to active metabolites) and these metabolites are then excreted renally. A reduction in glomerular filtration rate is a noted consequence of aging. Knowing which drugs are excreted renally and knowing how to adjust the doses of those drugs in patients with renal impairment is imperative to ensure safe and effective drug dosing in all patients." http://www.the-hospitalist.org/details/article/234051/Drugs_and_the_Elderly.html and http://www.medscape.com/viewarticle/769412_2 and http://nihseniorhealth.gov/takingmedicines/drugsinthebody/01.html

Other web sites to consider: www.nihseniorhealth.gov
http://www.pharmacy.ca.gov/publications/health_notes_drug_therapy.pdf
Information about geriatric hospital polypharmacy can be found at the following link:
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3038805/