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Ask The Pharmacist: Pharmacokinetic Changes that Occur in Older Adults

April 4, 2023
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How does aging affect drug performance?

The passing of time and changing performance of our physiologic, musculoskeletal and neurologic systems doesn't affect us all identically. Aging can be thought of as an accumulation of function loss in organs and tissues, as well as disruptions in the physiologic processes that integrate the activity of cells and organs to maintain "homeostasis." Understanding of age-altered pharmacokinetic and pharmacodynamic processes can assist in medication selection, as well as dosing adjustments for older patients that can avoid unexpected medication reactions and effects. Forty percent of adults over 65 years of age take five to nine medications per day and 18% take 10 or more. Patients who are over 75 are three times more likely to suffer adverse drug reactions than middle-aged adults.

When we consider drug pharmacokinetics (how they are absorbed, distributed, metabolized and excreted), it's true that all of these are influenced, to some degree, by aging. For example, the pH of the aging gut is reduced (more acidic), which may affect the rate and extent of a drug's dissolution. Reduced blood flow to the intestine, where most drug absorption takes place, may result in a reduced amount of drug absorbed. Age-related reductions in liver mass and blood flow may result in reduced metabolism of medications whose bioavailability is increased as a result. A reduced number of nephrons (filtering capacity) and kidney blood flow in older persons results in a lower rate and extent of drug elimination. "Start low and go slow" is a popular axiom in drug dosing for older patients that follows an appreciation that drug clearance may be less efficient, creating the potential for overdose toxicity at lower doses than are recommended for younger patients. High doses and long-acting formulations of opioids are especially concerning in this respect.

Pharmacodynamic changes are equally important in predicting differences in drug response between older and younger adults. Specifically, differences in drug receptor sensitivity and related responses, as well as impaired ability to adjust core body functions like blood pressure, bladder function, temperature and blood sugar levels

make drug side effects more likely and potentially more clinically significant for older patients. They are especially sensitive to side effects of medications that are active in the central nervous system, such as benzodiazepines (increased sedation), neuroleptic medications (delirium, arrhythmias, postural hypotension) and opioids (respiratory depression, constipation). This older population also exhibit exaggerated responses to anticoagulants or certain antihypertensive medications.

Aging, taken together with the increased number of treated conditions and prescribed medications, becomes a significant cause for vigilance in prescribing. Health care providers who treat aging patients are all very familiar with a set of evidence-based prescribing criteria called the Beers Criteria for older adults (named for its original author). It is updated and published by the American Geriatrics Society, which identifies potentially inappropriate medications and cautions associated with their prescribing in persons over 65.

This information is meant to serve as a general overview, and any specific questions or concerns should be more fully reviewed with your health care professional such as the prescribing doctor or dispensing pharmacist.

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