**Timothy Morin Post**

**Variations in Drug Response**

            Drug interaction within the body is essential for individuals to understand. Although prescription drugs are intended to be therapeutic, they can cause side effects or produce addictive behaviors. Pharmacology is a branch of medicine that focuses on how drugs and medications affect the body. Professionals who administer medications are concerned with drug interaction, the time of onset, and the duration of the drug’s effects (Advokat et al., 2018). Pharmacokinetics is the process that details the movement of drugs within the body and can be expressed with the acronym ADME (absorption, distribution, metabolism, and excretion). Drugs that are absorbed in the body either enter through the gastrointestinal (GI) tract enterally (oral or rectum) or does not utilize the GI tract and enters through parenteral routes, such as inhalation, injection, or absorbed through the skin and mucous membranes (Advokat et al., 2018). This discussion will focus on the oral administration of Valium within two patients (Ms. Jones and Mr. Smith) and compare how their bodies metabolize the drug based on their physical characteristics. It will also explain the factors that impact pharmacokinetics and the risk-benefit analysis of the drug.

**Oral Administration of Drugs**

            When solid forms of drugs are administered orally, they are anticipated to remain effective in the body as they are being absorbed. This process can be altered when gastric acids destroy drugs within the stomach before they become soluble and are able to penetrate the lining of the stomach, or intestine, into the bloodstream (Advokat et al., 2018). However, several other positive and negative factors can affect the absorption of drugs and their effects within the body, specifically Valium. Food is an essential factor to consider when an individual is taking medications. Food can decrease the absorption rate, or it can increase the amount of absorption. The chemistry of drugs that are of solid form and their dissolution rate can limit the rate of absorption as well. The solubility of medications is also critical to understand. Valium is a highly lipid-soluble and is absorbed faster than others that are less soluble as 75% enter the bloodstream within hours after administration (Advokat et al., 2018). Once the GI tract absorbs the drug molecules, they are metabolized in the liver after being collected from the hepatic portal vein. After the first-pass metabolism process, molecules enter the bloodstream and are circulated throughout the body to the action site, or receptor. Disadvantages of oral administration can encompass genetics and physiological factors. A genetic disadvantage is that it is difficult to calculate the absorption rate in individuals because of the varying amounts of enzymes a person may have to metabolize drugs (Advokat et al., 2018). Some physiological factors of oral administration include stomach distress, nausea, and vomiting.

**Patient Comparison and Pharmacokinetics of Alcohol and Drugs**

            Alcohol and other physical characteristics can have an impact on the effects of drugs within the body. Ms. Jones is a 30-year-old female that weighs 110 lbs. and is 5’ 4’’ tall. Mr. Smith is a 65-year-old male that weighs 235 lbs. and is 6’ tall. They both consume alcohol; however, Ms. Jones drinks often and occasionally more than she should, while Mr. Smith rarely drinks. Alcohol dehydrogenase (ADH) is an enzyme found in the GI tract and the liver that metabolizes alcohol. Men have 50% more of these enzymes than women, which results in lower blood levels than women when a specific amount of alcohol is ingested (Advokat et al., 2018). As referenced previously, drinking alcohol on an empty stomach or with food can also affect metabolism and blood levels. On an empty stomach, alcohol is absorbed faster than when consuming alcohol with food. When consumed with food, alcohol gets more exposure to gastric ADH, reducing blood levels. This process is important because ADH enzymes will only metabolize alcohol at a constant amount per hour, regardless of the amount present, which could affect the metabolism rate of drugs, referred to as the first-order elimination (Advokat et al., 2018). Another factor that affects alcohol and drug absorption is body fat. Women have a lower ratio of muscle to fat than men, resulting in decreased blood alcohol levels in men due to alcohol being comparatively diluted in the body (Advokat et al., 2018). An individual’s height and weight can also produce effects. For example, a man who drinks five alcoholic beverages in four hours will have a lower blood alcohol content than a woman who consumes the same amount at a similar rate.

**Risk-Benefit Analysis of Valium**

Valium (Diazepam) is a scheduled IV controlled substance and is a benzodiazepine. Valium has been used to treat anxiety, muscle spasms, and seizures. It interacts with the gamma-aminobutyric acid (GABA) neurotransmitter at the action site and produces muscle relaxation and sedation (Advokat et al., 2018). Although it can produce therapeutic results, mixing benzodiazepines with alcohol can promote addiction and increased sedation. Side effects include impaired judgment and motor skills, reduced performance, and decreased alertness and intellectual skills. More severely, the mixture can produce amnesia, suicidal ideation, paranoia, and slowed breathing leading to death (Van Steveninck et al., 1996). The shelf life of Valium is about 30 hours and can take longer in older adults, such as Mr. Smith, which has been estimated at approximately four weeks or longer (Advokat et al., 2018). Understanding the pharmacokinetics and pharmacodynamics of Valium, along with other factors, such as mixtures with other drugs and shelf life, can reduce possible side effects and can assist in prolonging its therapeutic outcomes.

References

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