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SEXUAL DIMORPHISM IN MEDICINE EFFICACY

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Abstract: Sexual dimorphism is the different characteristics in the same species, it exists deep down up to medicine efficacy. In other words, same medicine may not be efficient in man and woman equally for a particular disease;unfortunately, drug trails with these considerations. there is a lot of scope exists to do more research in this area.

Keywords: Sexual dimorphism, medicine efficacy

INTRODUCTION

Men and women have several biological differences, broadly speaking, chromosomes, hormones, and physical traits (1). Their systems react differently to certain chemicals. Research has also noted that women's physiology means they are more biologically sensitive than men to many pesticides currently in use. (2). They also react differently to stimuli (3). Bradley et al studied startle reflex reactions and revealed that women exhibit a stronger response to negative stimuli (4). However, an increasing number of studies have shown that men exhibit more intense emotional reactions, particularly to stimuli that are perceived to be threatening [5) or erotic (6)

Interaction of drugs with hormones : Drugs can interact with the endocrine system in many ways.Stimulant drugs, such as amphetamines and cocaine, can also have significant impacts on hormonal balance. These drugs affect the release and reuptake of neurotransmitters in the brain, which can indirectly influence hormone production and regulation. For Example:

- Hormone production: Drugs can directly alter hormone production. For example, stimulant drugs like cocaine and amphetamines can increase the release of adrenaline and dopamine (7).
- Hormone metabolism: Drugs can change the rate at which hormones are removed from the body, or modify how they are metabolized (8).
- Hormone binding: Drugs can change how hormones bind to proteins.
- Hormonal transport: Drugs can affect how hormones are transported (9)
- Hormonal signaling: Drugs interfere with the way neurons send, receive, and process signals via neurotransmitters. Some drugs, such as marijuana and heroin, can activate neurons because their chemical structure mimics that of a natural neurotransmitter in the body. This allows the drugs to attach onto and activate the neurons(10).

Differences in Medication Effects Between Women and Men*

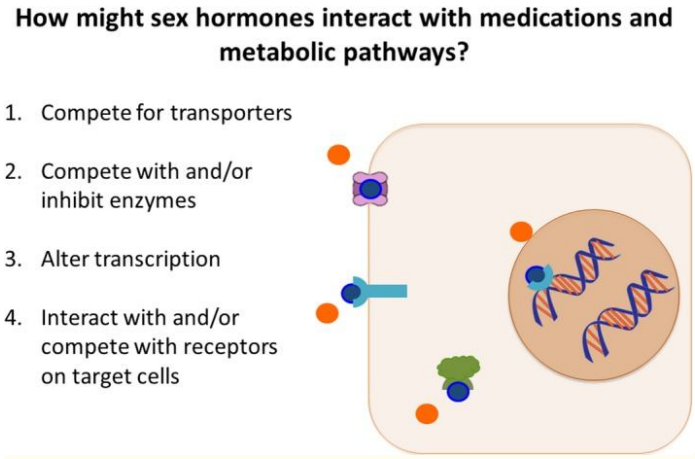
Drug class	Effect	Recommendation
Aspirin	Poorer platelet inhibition and heart attack protection in women; poorer stroke prevention in men	Consider using higher dosages in women for secondary prevention after a cardiovascular event
Beta blockers	Enhanced lowering of blood pressure and heart rate when	Monitor blood pressure and heart rate

Drug class	Effect	Recommendation
	exercising in women	
Digoxin	Increased mortality in women	Women require a lower dosage and a lower target serum concentration of 0.8 ng per mL (1.02 nmol per L)
Opioids	Greater analgesic response in women	Men require a 30 to 40 percent greater dosage of morphine than women
Selective serotonin reuptake inhibitors	Enhanced effect in women	Preferred therapy in women with depressive symptoms
Tricyclic antidepressants	Reduced effect in women	Choose alternative with improved effectiveness in women
Typical antipsychotics	Enhanced effect in women	Lower dosage in women or increase dosage in men

Based on
HEATHER P. WHITLEY, , and WESLEY LINDSEY, Sex-Based Differences in Drug ActivityAm Fam Physician. 2009;80(11):1254-1258

Estrogens are the Main Factor: Estradiol is a naturally occurring hormone circulating endogenously in females and their levels fluctuate during onset of puberty, pregnancy and at the onset of menopauses. In addition to these three events in woman's life during periods estrogen and progesterone levels also changes (11- 15). Estrogens can affect the absorption of drugs in a number of ways, can affect the absorption of drugs through intestinal metabolism and the endocrine system (Fig.1).

Estrogens can also interact with drugs to alter their metabolism and plasma protein binding (16). Estrogen receptors (ERs) act by regulating transcriptional processes. The classical mechanism of ER action involves estrogen binding to receptors in the nucleus, after which the receptors dimerize and bind to specific response elements known as estrogen response elements (EREs) located in the promoters of target genes. For example, Abacavir is in a class of medications called nucleoside reverse transcriptase inhibitors (NRTIs). It works by decreasing the amount of HIV in the blood. Estradiol may decrease the excretion rate of Abacavir which could result in a higher serum level (17).



Schematic representation of potential mechanisms through which sex steroid hormones can affect drug metabolism and actions(16) leading to adverse drug reactions. The orange circles represent a medication and the blue circles represent a hormone that is competing with the medication. The purple

symbol represents a transporter. The green symbol represents an enzyme. The blue symbol on the cell surface represents a receptor. The blue symbol interacting with the DNA represents a transcription factor

Administration of abciximab during percutaneous coronary intervention reduces both ex vivo platelet thrombus formation and fibrin deposition: implications for a potential anticoagulant effect of abciximab(18). The risk or severity of adverse effects can be increased when Estradiol is combined with Abciximab. With drug AbemaciclibEstradiol may decrease the excretion ate of Abemaciclib which could result in a higher serum level.

(**Drug Disposition:** Physiologic differences between men and women affect drug activity, including pharmacokinetics and pharmacodynamics (19). Pharmacokinetics in women is affected by lower body weight.Many factors influence circulating drug concentrations, as well as the concentrations at the sites of action. Sex, in particular, can influence how the body handles a drug as well as what the drug does to the body for example in woman due toslower gastrointestinal motility, less intestinal enzymatic activity, and slower glomerular filtration rate affects drug disposition [20].

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