

The Impact of Sex and Gender on Disease and Medication

Marissa C. Salvo, PharmD, BCACP
 Associate Clinical Professor
 Department of Pharmacy Practice
 University of Connecticut School of Pharmacy

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I have nothing to disclose.

Objectives

1. Define sex and gender based medicine terminology.
2. Explain sex differences in disease presentation.
3. Identify and select medication(s) considering sex and gender.
4. Recognize opportunities for pharmacists to practice sex and gender based medicine


Terminology

Sex and Gender

Sex	Gender
<ul style="list-style-type: none"> • Biological differences <ul style="list-style-type: none"> - Sex organs - Hormones - Chromosomes 	<ul style="list-style-type: none"> • Characteristics that a society or culture attributes to masculine or feminine
Intersex	
<ul style="list-style-type: none"> • Identity associated with having a disorder or difference of sex development 	

Sex and Gender. NIH. <https://orwh.od.nih.gov/sex-gender>

There's More to Gender...

Gender Identity	Gender Expression
<ul style="list-style-type: none"> • An individual's intrinsic sense of self and how they fit into the world, from the perspective of gender 	<ul style="list-style-type: none"> • Outward manner one uses to present their gender
	Gender Nonconforming
	<ul style="list-style-type: none"> • Person whose gender identity, role, or expression is different from what is assigned at birth or what is considered normative for their assigned sex in a given culture or historical period

Transgender Patients. IN: ASCAP 2018 Book 2. 2018.


And More...!

Transgender

- An umbrella term for people whose gender identity and expression differs from the sex assigned at birth

Cisgender

- A word used to describe those whose sex assigned at birth matches gender identity and expression



Nonbinary

- Transgender or gender-nonconforming person who does not identify either wither sex

Transgender Patients. In: ASCAP 2018 Book 2, 2018.

So *what is* Sex and Gender Based Medicine (SGBM)?

“With continuous interaction between sex and gender, health is determined by both biology and the expression of gender.”

National Institutes of Health Office of Research on Women’s Health

Sex and Gender. NIH. <https://orwh.od.nih.gov/sex-gender>
 What is Gender Based Medicine? <https://www.laurabushinstitute.org/gender/default.aspx>

SGBM Implications

- Research
- Education
- Practice
- Outreach

Sex and Gender. NIH. <https://orwh.od.nih.gov/sex-gender>
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Differences in Disease Presentation

Does Sex *Really* Matter?

“There are **multiple, ubiquitous differences** in the basic **cellular biochemistry** of males and females that can affect an individual’s health.”

“Every cell has a sex”

IOM Report, 2001

Wizeman et al, *Nat Academy Press* (2001)

True or False

Depression is twice as common in women.

Gender and Women’s Mental Health. WHO. http://www.who.int/mental_health/prevention/genderwomen/en/

True or False

Men and women experience the same heart attack symptoms.

How Sex /Gender Influence Health and Disease (A-Z), NIH. <https://orwh.od.nih.gov/sex-gender>
What is Gender Based Medicine? <https://www.laurabushinstitute.org/gender/default.aspx>
Heart Disease in Women, NHBUI. <https://www.nhlbi.nih.gov/health-topics/heart-disease-women>

True or False

Men are twice as likely to die after an osteoporotic hip fracture compared to women.

Nat Rev Endocrinol. 2013;9(11):637-45.
J Am Geriatr Soc. 2011;59(5):806-813

True or False

Low-dose aspirin reduces the risk of heart attacks in women.

JAMA. 2006. 295(3):306-13.

True or False

Nicotine replacement therapy has the same efficacy in smoking-cessation for men and women.

How Sex /Gender Influence Health and Disease (A-Z), NIH. <https://orwh.od.nih.gov/sex-gender>
Tobacco, Nicotine, and E-cigarettes, NIH. <https://www.drugabuse.gov/publications/research-reports/tobacco-nicotine-e-cigarettes/are-there-gender-differences-in-tobacco-smoking>

True or False

Men are more severely affected by autoimmune disorders, such as lupus and multiple sclerosis.

Am J of Path. 2008;173(3):600-609.
Front Neuroendocrinol. 2014. 35(3):347-69.
How Sex /Gender Influence Health and Disease (A-Z), NIH. <https://orwh.od.nih.gov/sex-gender>

Implications on Medications

Sex Differences

- Pharmacokinetics
- Pharmacodynamics
- Adverse Drug Effects



Pharmacokinetics

Absorption

- Dependent on route of administration
- Oral
 - Gastric motility
 - GI enzymes in drug metabolism

Distribution

- Body composition
 - Weight
 - Fat
- Plasma volume
- Plasma protein binding

Franconi F, Campesi I. Br J Pharmacol. 2014;171:580-94.
 Schwartz JB. Clin Pharmacokinet. 2013;42:107-21.
 Meibohm B, Beierle I, Derendorf H. Clin Pharmacokinet. 2002;41:329-42.

Pharmacokinetics

Metabolism

- Phase I
 - CYP 1A2
 - CYP 3A4
 - CYP 2D6
- Phase 2
 - COMT

Excretion

- eGFR

Franconi F, Campesi I. Br J Pharmacol. 2014;171:580-94.
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Pharmacodynamics


- Central Nervous System Medications
 - Depression
 - Pain
- Cardiovascular Medications
 - Aspirin
 - Statins

Franconi F, Campesi I. Br J Pharmacol. 2014;171:580-94.
 Schwartz JB. Clin Pharmacokinet. 2013;42:107-21.
 Meibohm B, Beierle I, Derendorf H. Clin Pharmacokinet. 2002;41:329-42.

Adverse Effects

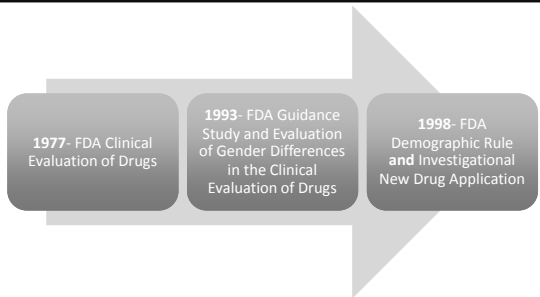
- Occur more in women
- QTc prolongation
- Other ADEs

- Jan. 1997- Dec. 2000
 - 10 prescription medications withdrawn from U.S. Market
 - 8 associated with more adverse events in women



Franconi F, Campesi I. Br J Pharmacol. 2014;171:580-94.
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 Meibohm B, Beierle I, Derendorf H. Clin Pharmacokinet. 2002;41:329-42.
 Nicolson TJ, Mellor HR, Roberts RRA. Trends Pharmacol Sci. 2010;31:108-14.

History



1977- FDA Clinical Evaluation of Drugs

1993- FDA Guidance Study and Evaluation of Gender Differences in the Clinical Evaluation of Drugs

1998- FDA Demographic Rule and Investigational New Drug Application

Understanding Sex Differences at FDA. <https://www.fda.gov/scienceresearch/specialtopics/womenshealthresearch/ucm131182.htm>

Opportunities for Pharmacists

Education

- Recognize SGBM as an integral part of the patient care process
- Educate yourself, trainees, and patients!
 - Online course series
 - The Science of Sex & Gender in Human Health
 - <https://sexandgendercourse.od.nih.gov>
- Stay abreast of SGBM updates

Practice and Promote

- Consider SGBM during clinical encounters
- Pharmacist Patient Care Process
 - Collect
 - Assess
 - Plan
 - Implement
 - Follow-up: Monitor and Evaluate
- Advocate for advancing and integrating SGBM

The Pharmacists Patient Care Process. <https://cpp.net/patient-care-process/>. Accessed Nov. 2018.

SGBM and Patient Communication

- A**
- Ask open-ended questions
 - Acceptance
 - Avoid Assumptions
- B**
- Be respectful
- C**
- Create a welcoming and inclusive environment

Case Application

Casey, 60 years old, presents for your first MTM session. You collect the following information:

PMH:

Depression
h/o opioid abuse
Lower back pain with sciatica
Hypertension
h/o MI (2 years ago)

SH:

Tobacco: Current (1ppd x 40 years)
Illicit Drugs:

FH:

Father- deceased (MI @ 50yo)
Mother- alive (79yo); h/o breast cancer

Medications:

Metoprolol succinate 50 mg PO daily
Sertraline 100mg PO daily
Gabapentin 300 mg PO TID
Lisinopril 10mg PO daily
Rosuvastatin 20mg PO daily
Aspirin 81mg PO daily

Question 1

What is the patient's sex?

- A. Male
- B. Female

Question 2

What medications have sex and gender implications?

1. Metoprolol succinate
2. Lisinopril
3. Sertraline
4. Rosuvastatin

- A. 1 and 2
B. 1 and 3
C. 1, 2, and 3
D. 1, 3, and 4

Question 3

What opportunities as a pharmacist do you have to practice sex and gender-based medicine (SGBM) for this patient?

- A. There is no need to practice SGBM.
- B. Educate the patient about SGBM.
- C. Encourage medication adherence.
- D. Call prescribers to modify the medication regimen.

And then....

During your session, Casey inquires about the use of zolpidem for sleep.

What sex and gender-based medicine (SGBM) considerations might be on your radar?

- A. Zolpidem has different maximum doses for men and women.
- B. Zolpidem has the same maximum doses for men and women.
- C. Zolpidem is not effective in women.
- D. Zolpidem is not effective in men.

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