



A Discussion on Gender and Science

“We live in a binary society, but research shows us that sex is anything but binary”

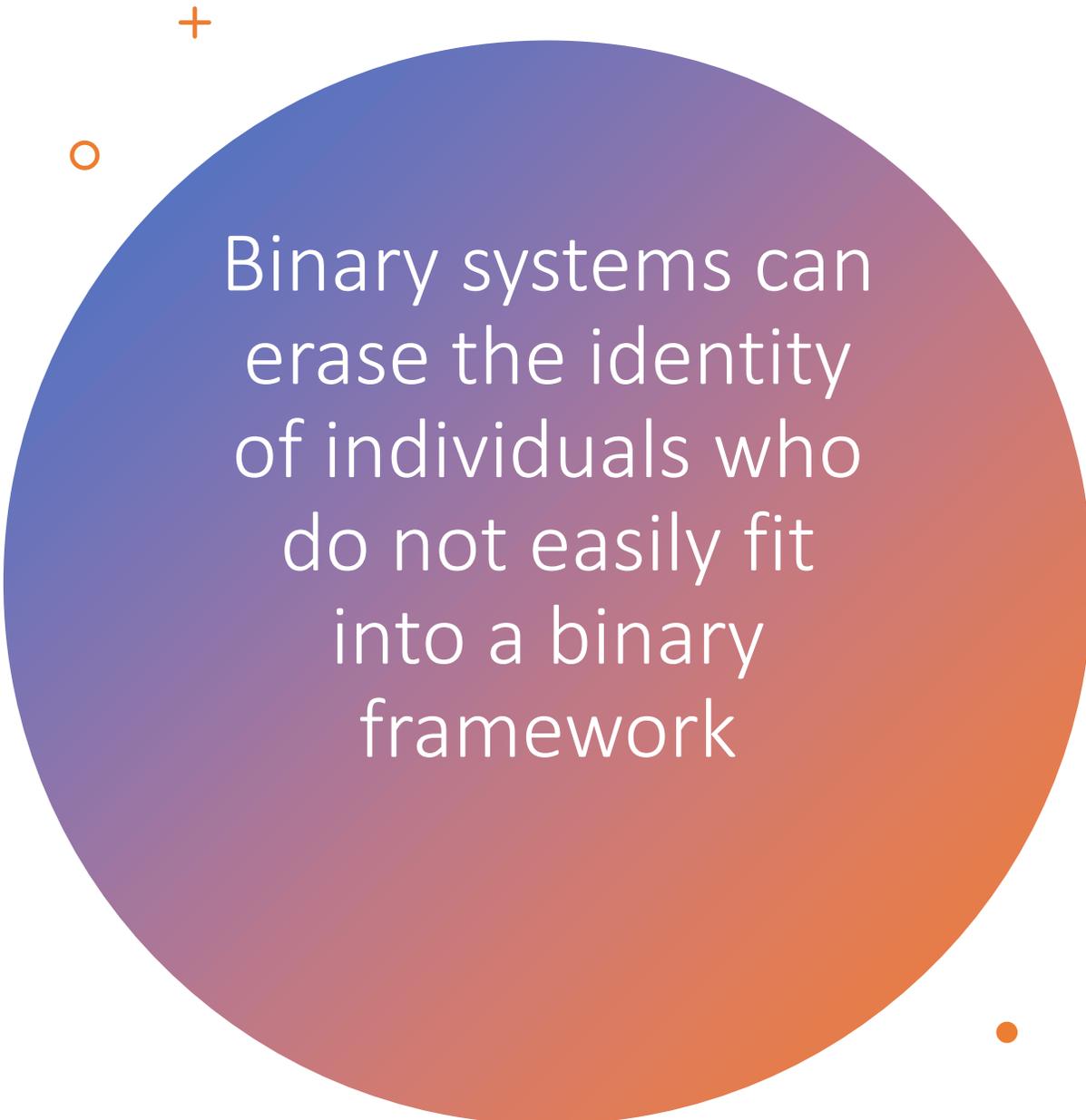
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Simon D Sun, “Stop Using Phony Science to Justify Transphobia”, Scientific American,  
June 13, 2019

# Binary Systems are Social Constructs

MEN  
Practical  
Strong  
NOT woman

WOMEN  
Emotional  
Weak  
NOT man



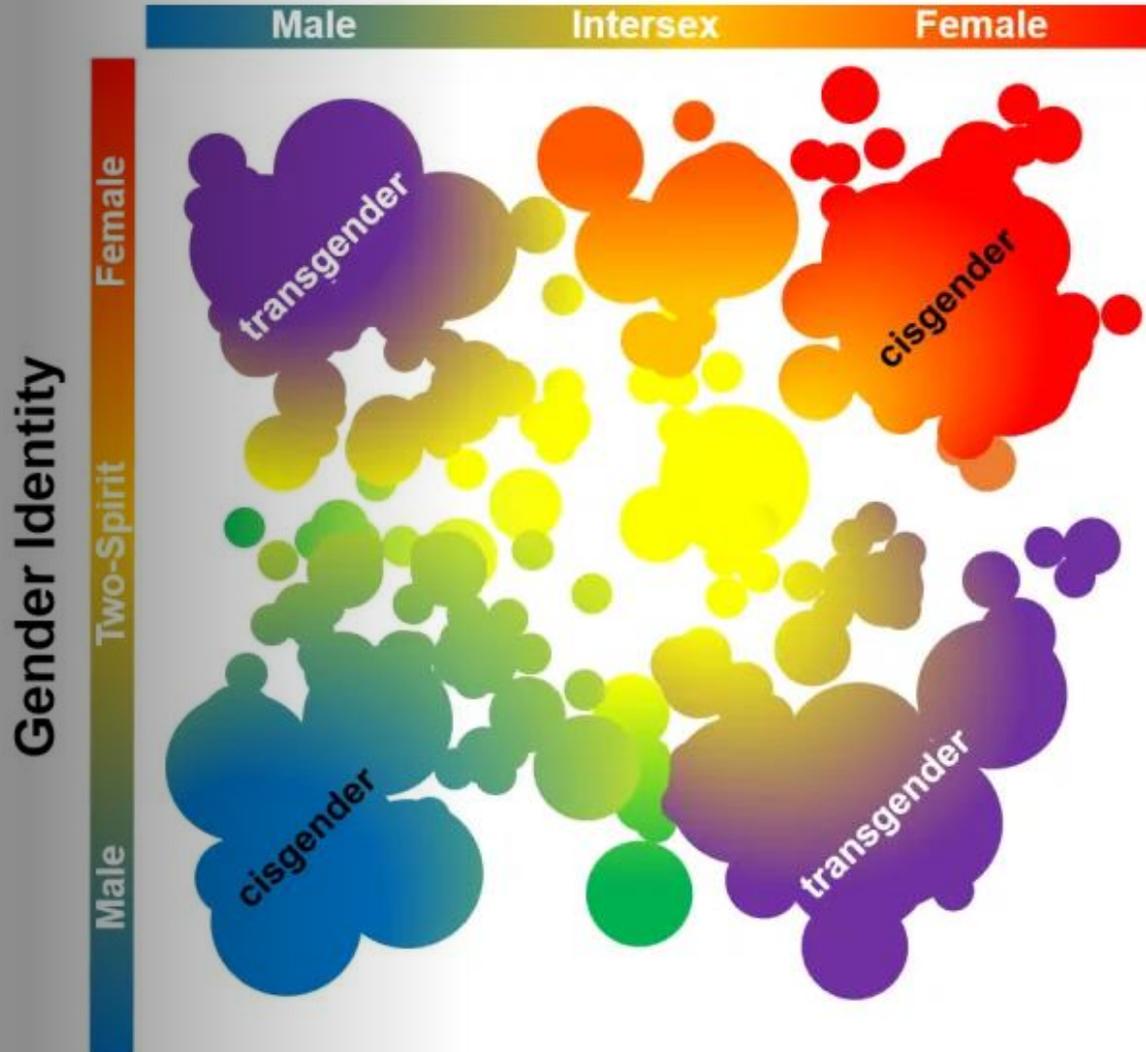
Binary systems can  
erase the identity  
of individuals who  
do not easily fit  
into a binary  
framework

The Goal of this presentation is to create an opportunity for us to entertain the possibility that male and female genders are not completely different and that gender is varied and complex.



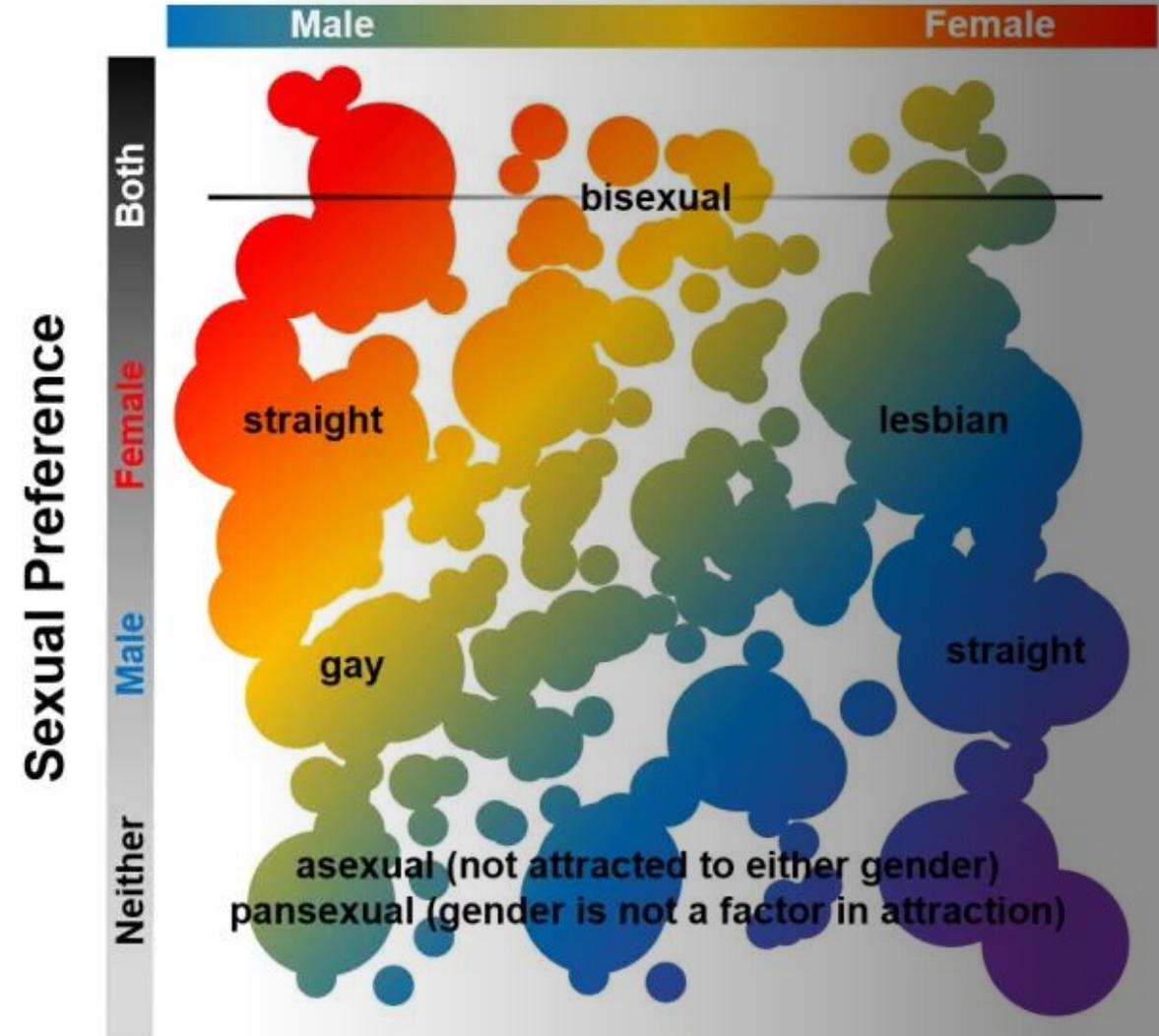
# GENDER IDENTITY

## Biological Gender



# SEXUAL ORIENTATION

## Gender Identity





“Sex is a societal  
construct.”

Baker & Rubin

Gender Theorists Judith Baker and Gayle Rubin challenge the notion that any person has an underlying sex.

According to USNEWS.com the **Best Sex and Gender Programs are:**

1. Stanford
2. New York University
3. University of California Berkeley

# Point of Discussion

What does it mean that sex is a social construct?  
Can a person really be genderless?

# LGBTQQIAAP

Not an all-inclusive acronym

Demonstrates the complex vocabulary surrounding gender and sexual orientation

## **Transgender:**

identify with gender that differs from assigned sex

## **Cisgender:**

Identifies with assigned sex

## **Intersex:**

Variation in sex characteristics



# Intersex

- Variation of chromosomes, gonads, sex hormones and genitals
- Do not fit typical description of culturally accepted male/female
- Bodies viewed as different
- 1.5 % of people have sexual variation
- 2000 birth per year

According the Gender Inclusive Biology <https://www.genderinclusivebiology.com/>

# Transgender

- Transgender identity is separate from sexual identity
- It is estimated that 3% of the US population is transgender



# Point of Discussion

Do you find labels helpful?

Restrictive?

A source of stereotypes?

Do you agree that transgender identity is different than sexual identity?

What does that statement mean to you?

# Biological sex

Belief that sex arises from chromosomal makeup alone is wrong.

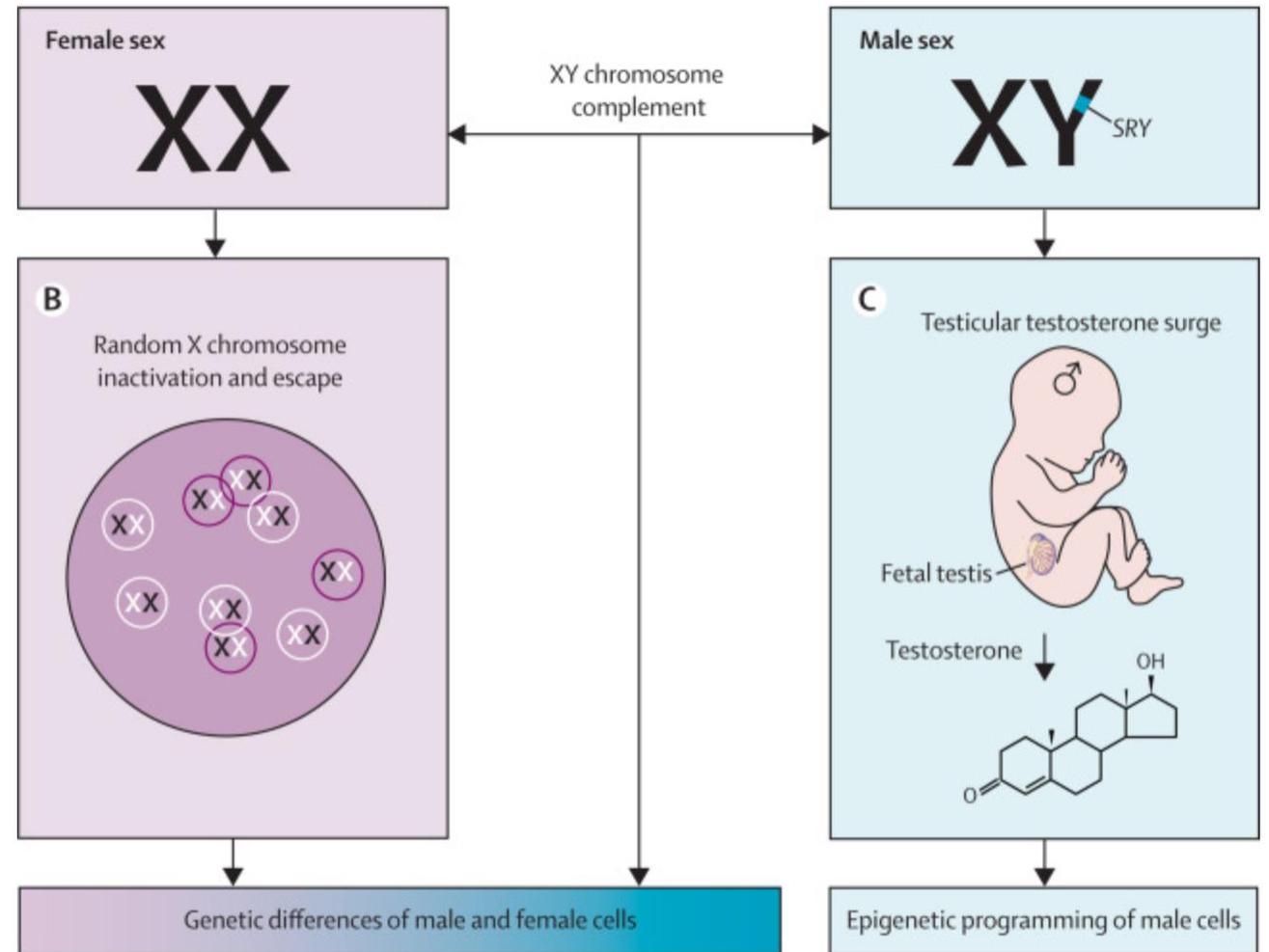
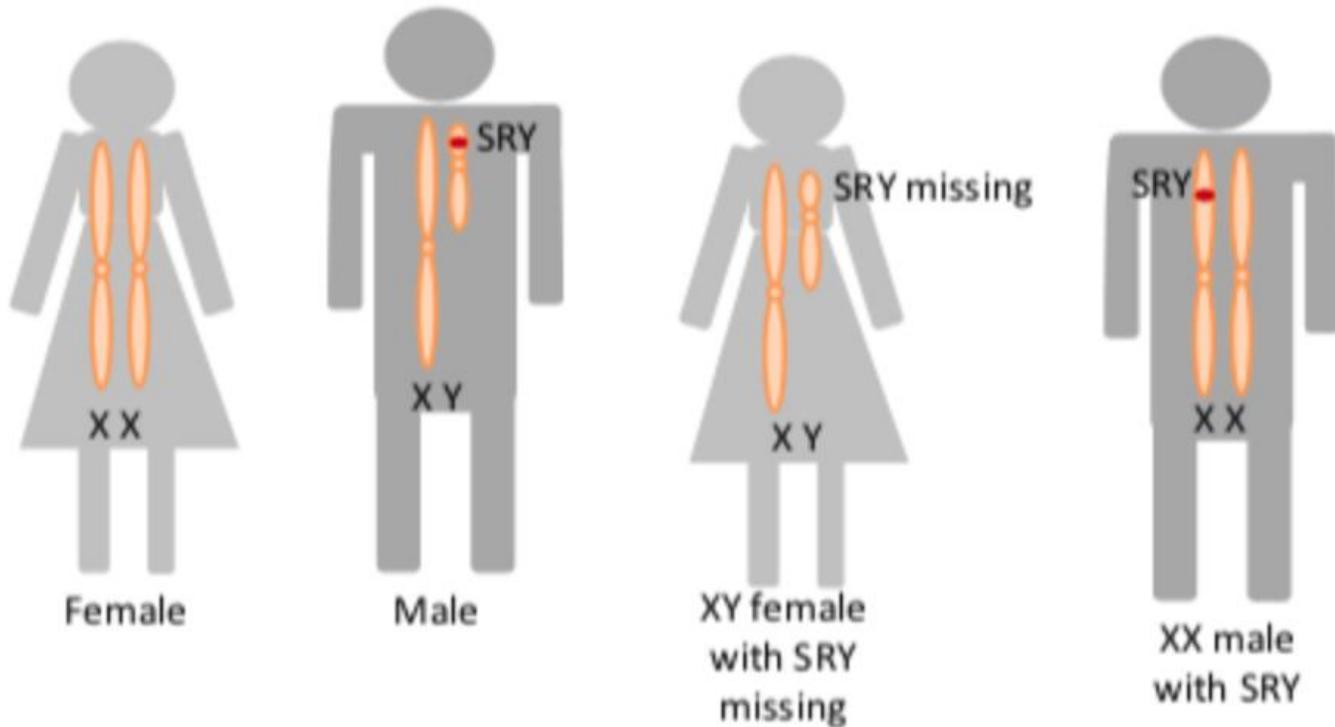


Figure 1 Genetic causes of sex differences

# SRY gene is found on the Y chromosome



- SRY is a transcription factor
- SRY influences a host of genes that collectively steer development down the male pathway.

## Point of Discussion

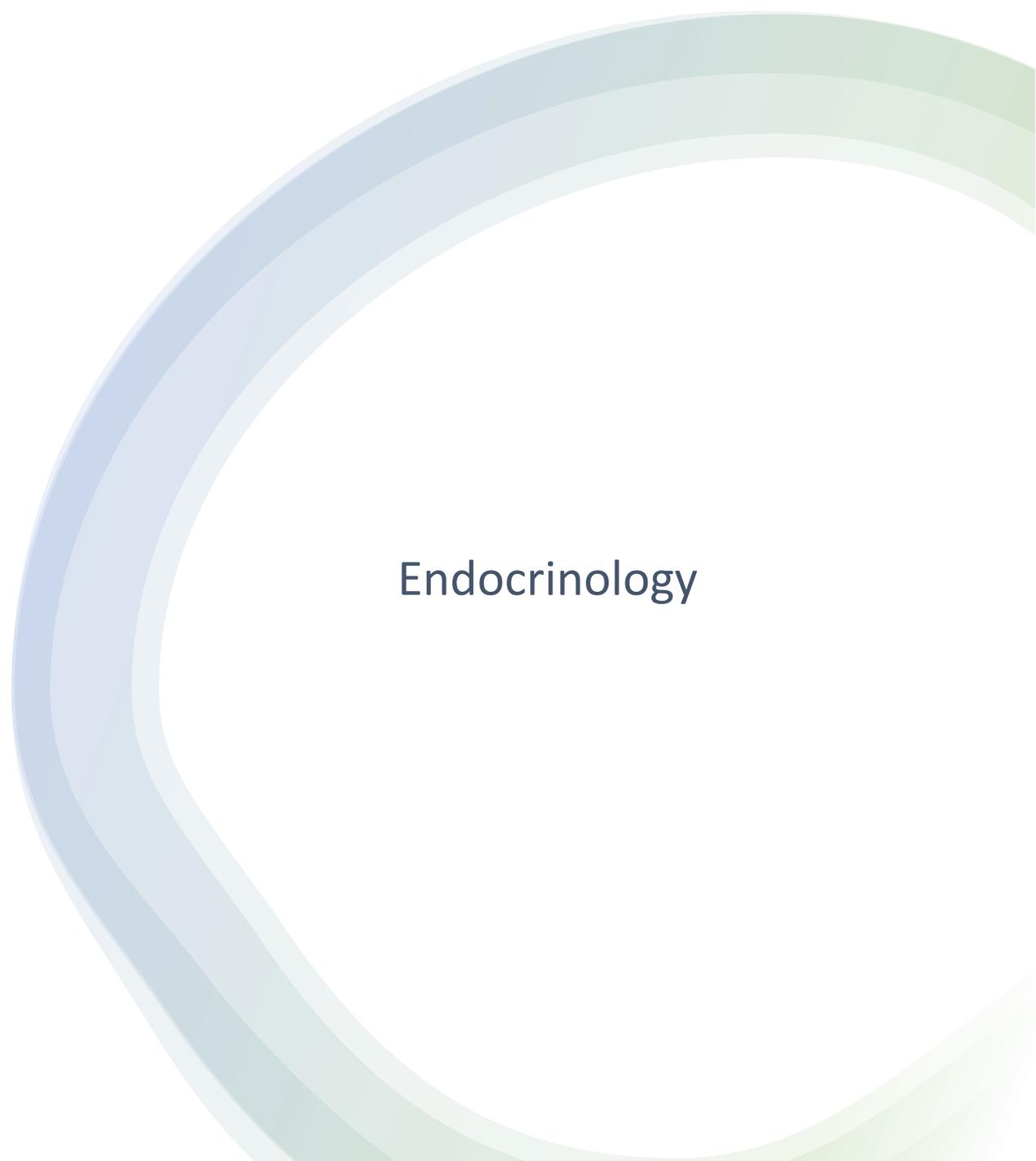
Can chromosomal influences on gender identity provide a biological explanation for variations in individuals that do not fit into a binary system?

Does accepting or relying on a scientific explanation of sex determination invalidate individuals?

Can it empower individuals?



## Part II



Endocrinology

# Hormonal Factors

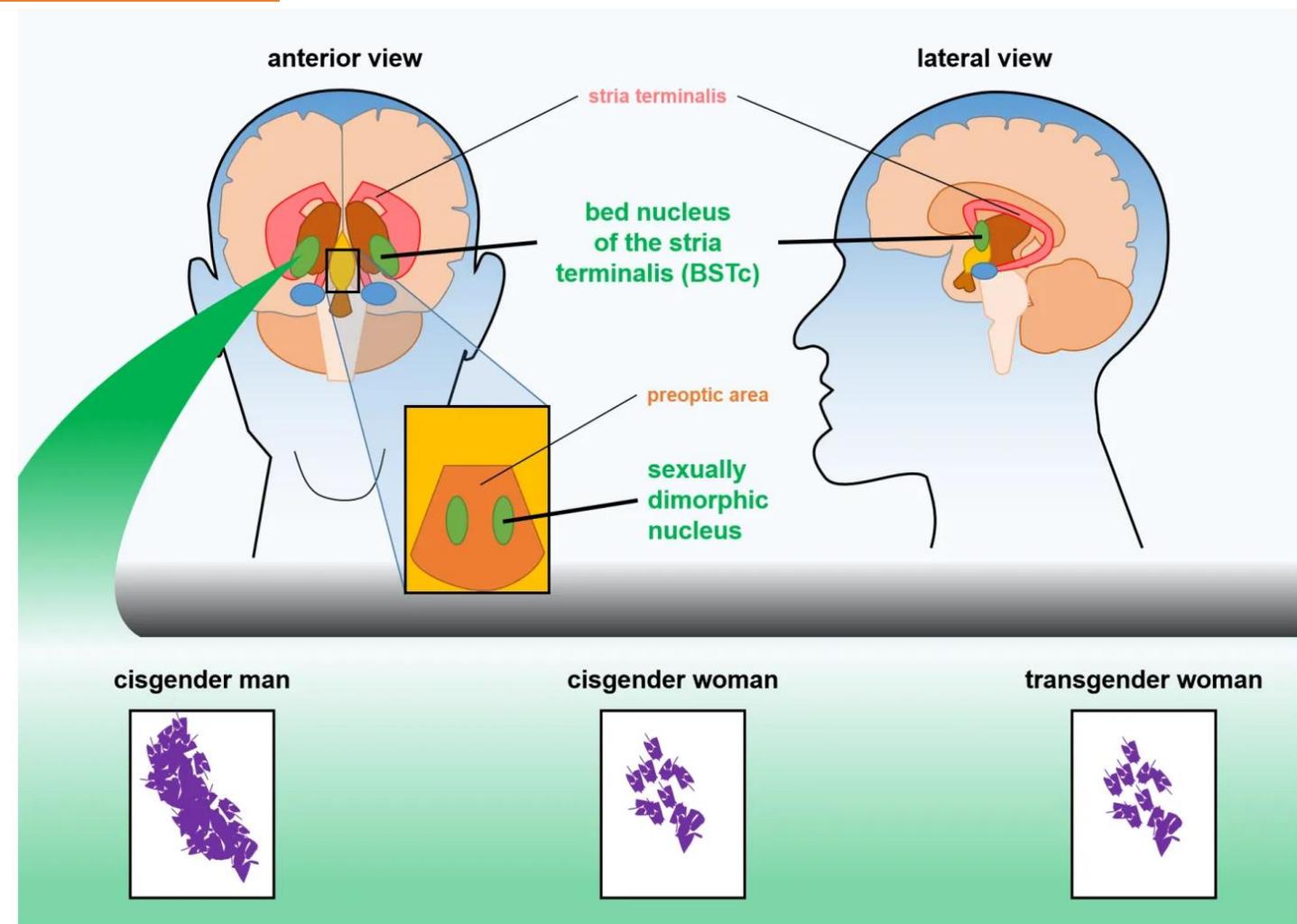


Figure 2:

Transgender women tend to have brain structures that resemble cisgender women, rather than cisgender men. Two sexually dimorphic (differing between men and women) areas of the brain are often compared between men and women. The bed nucleus of the stria terminalis (BSTc) and sexually dimorphic nucleus of transgender women are more similar to those of cisgender woman than to those of cisgender men, suggesting that the general brain structure of these women is in keeping with their gender identity.

## The Gender Spectrum

A transgender woman is a person who was assigned male at birth based on her anatomy but who identifies as a woman.

A cisgender woman is a person who was assigned female at birth based on her anatomy and who also identifies as a woman.

A nonbinary person is someone who identifies as neither completely female nor completely male. Such an individual may identify with both genders or neither gender, or they may be gender fluid, meaning their gender fluctuates between female and male.

A transgender man is a person who was assigned female at birth based on his anatomy but who identifies as a man.

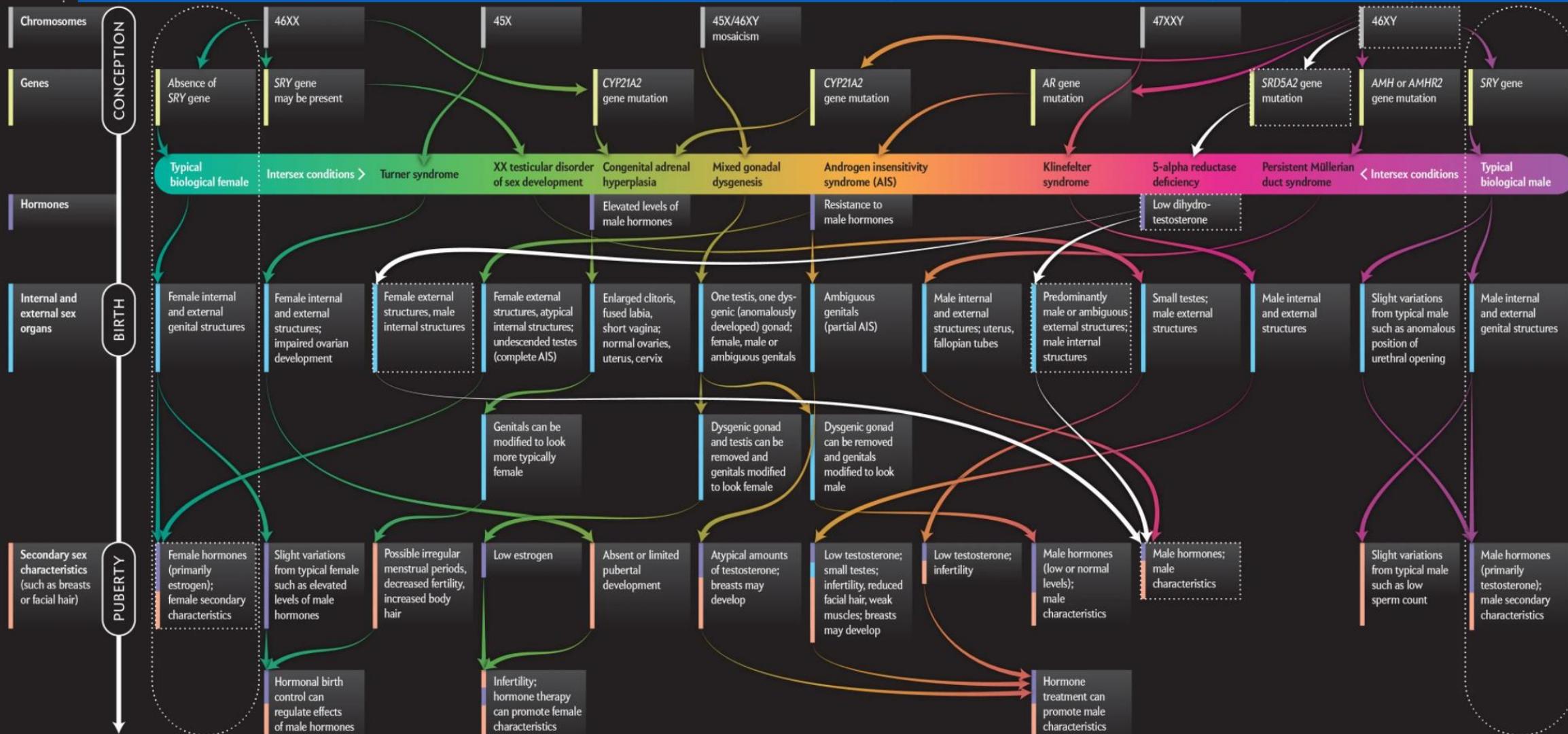
A cisgender man is a person who was assigned male at birth based on his anatomy and who also identifies as a man.

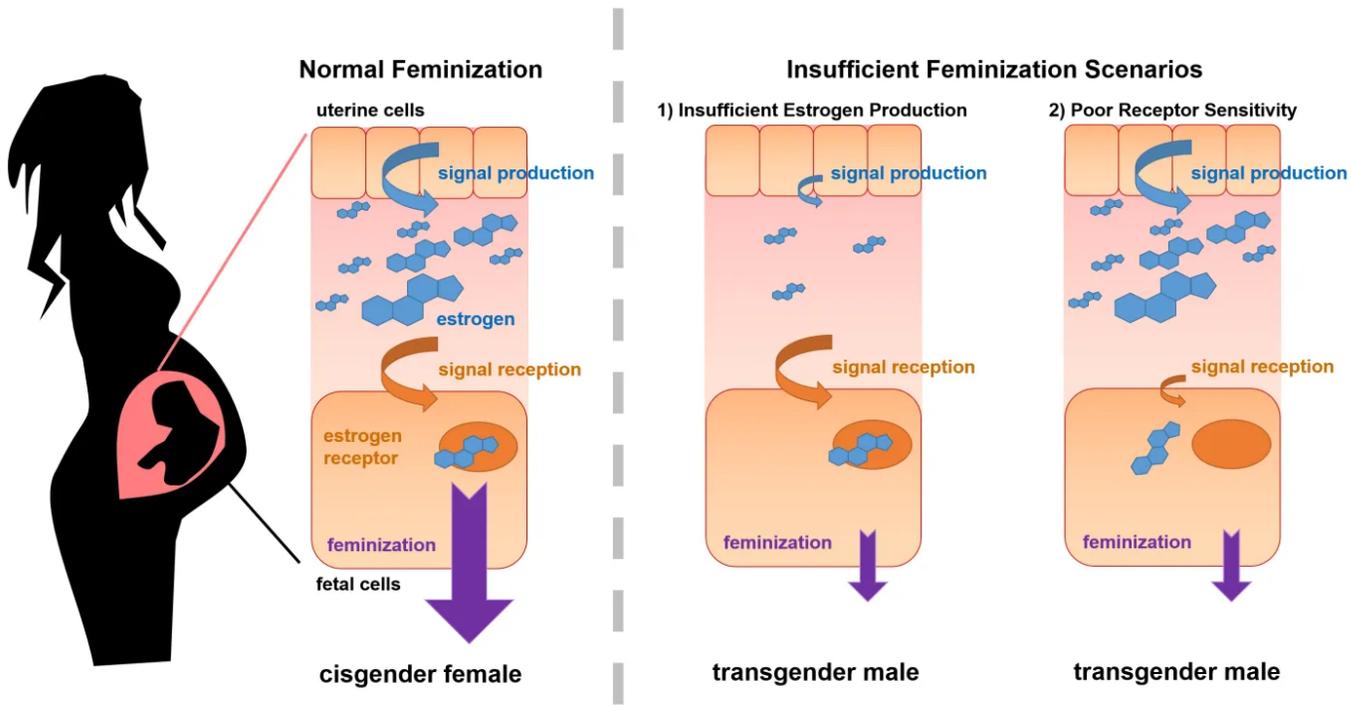
Sexuality refers to an individual's sexual orientation or to the kind of person to whom they are attracted. Sexuality is also a spectrum but is separate from both sex and gender.

follow multiple pathways throughout development. Affected individuals have a chromosomal makeup of 46XY, like a typical biological male, but a genetic mutation causes a deficiency of the hormone dihydrotestosterone. Patients' external anatomy can vary, so an individual might be assigned to either sex at birth, but at puberty a surge of testosterone promotes male characteristics. As a result, patients who are raised as girls often end up identifying as male.

FACTORS THAT DETERMINE SEX

<https://www.scientificamerican.com/article/beyond-xx-and-xy-the-extraordinary-complexity-of-sex-determination/>





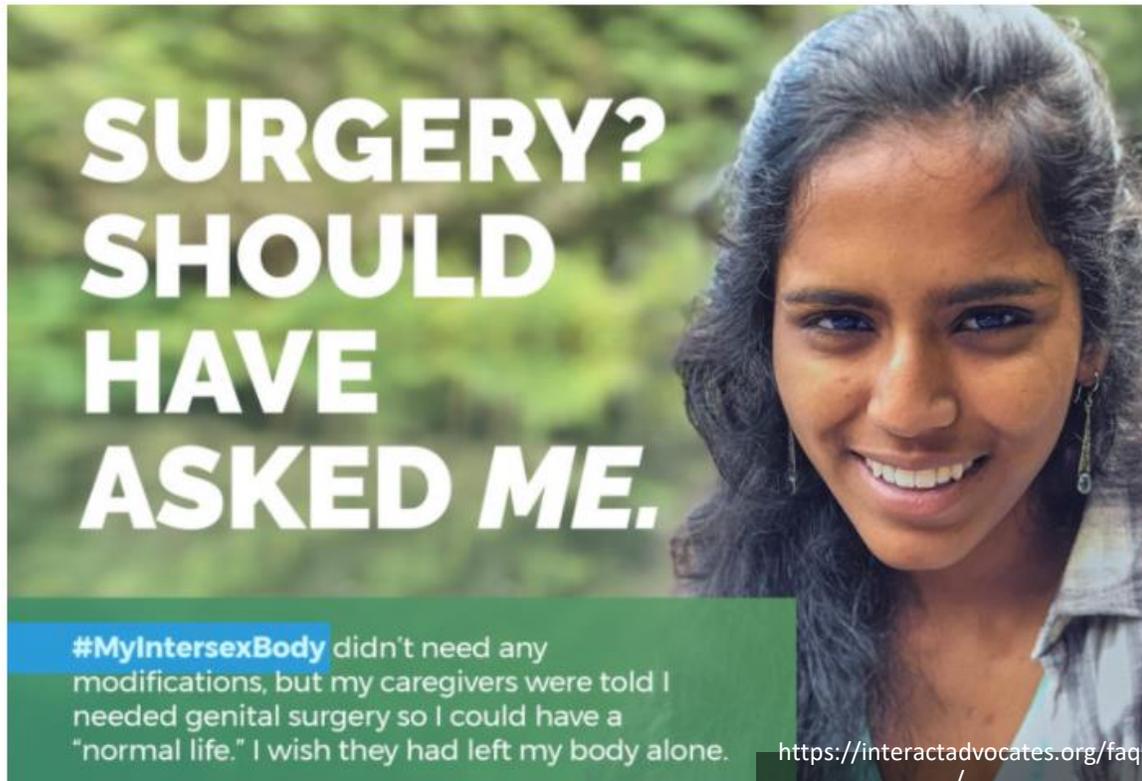
**Figure 3:** Possible

scenarios underlying insufficient feminization. During normal feminization, sufficient estrogen is present in the fetal environment. The estrogen is recognized by fetal cells and triggers the development of a female fetus. In Scenario 1, very little estrogen is present in the fetal environment. Even though the fetal cells are capable of sensing estrogen, very little enters the fetal environment and the fetus is insufficiently feminized. In Scenario 2, there is enough estrogen in the fetal environment, but fetal cells are effectively “deaf” to the estrogen and the fetus is insufficiently feminized.

# Point of Discussion

Cell communication encompasses the expression of genes through hormonal exposure and other factors.

In what ways can science support hormone therapies for non-binary individuals?



We know now that gender identity and sex determination is multifaceted and that individuals not conforming to a binary sexual system, as Wu of Scientific America stated, “are not suffering mental illness or are capriciously “choosing” a different identity. Transgender identity is multidimensional, but it deserves no less recognition or respect than any other facet of humankind.”

# Works Cited

1. *Wu, Katherine J., figures by Wierbowski, Brad; Between the (Gender) Lines: the Science of Transgender Identity*, [BLOG SPECIAL EDITION: DEAR MADAM/MISTER PRESIDENT](#), OCTOBER 25, 2016, [HTTP://SITN.HMS.HARVARD.EDU/FLASH/2016/GENDER-LINES-SCIENCE-TRANSGENDER-IDENTITY/](http://sitn.hms.harvard.edu/flash/2016/gender-lines-science-transgender-identity/)
2. [Simón\(e\) D Sun](#); "Stop Using Phony Science to Justify Transphobia, June 13, 2019. <https://blogs.scientificamerican.com/voices/stop-using-phony-science-to-justify-transphobia/>
3. [Amanda Montañez](#); Beyond XX and XY THE Extraordinary Complexity of Sex Determination, September 1, 2017. <https://www.scientificamerican.com/article/beyond-xx-and-xy-the-extraordinary-complexity-of-sex-determination/>
4. *Wu, Katherine J. , figures by Utter, Daniel; I'm XY and I Know It": Sex Determination Systems 101*. <http://sitn.hms.harvard.edu/flash/2016/im-xy-know-sex-determination-systems-101/>
5. [Gender And Sex – Transgender And Intersex \(Book Chapter\)](#), July 27, 2020. <https://www.genderinclusivebiology.com/newsletter/what-we-wish-our-teachers-knew-brochure-from-interact-advocates-83h5y>

# Point of Discussion

The floor is open for discussion on anything pertaining to gender and science.