DEI, Part 2

What do we mean by Sex vs Gender, and Sexual Orientation vs Gender Identity?

Why is this important?

Waverly AAUW

May 17, 2025

Ann Henninger, Ph.D.

"As of today, it will hence forth be the official policy of the United States government that there are only two genders: male and female." D.J. Trump inaugural address 1/20/2025

Executive Order, Defending Women from Gender Ideology Extremism and Restoring Biological Truth to the Federal Government, 1/20/2025

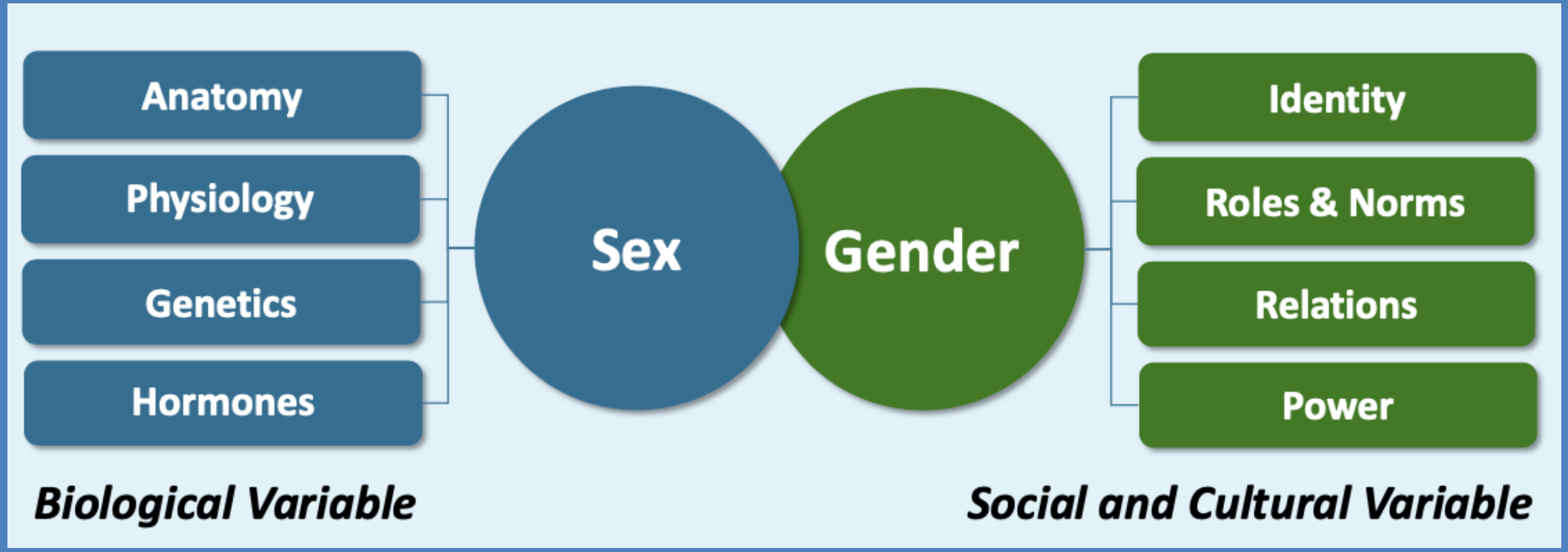
- It is the policy of the United States to recognize two sexes, male and female.
- "Sex" shall refer to an individual's immutable biological classification as either male or female. *
- "Gender identity" reflects a fully internal and subjective sense of self, disconnected from biological reality and sex and existing on an infinite continuum, that does not provide a meaningful basis for identification and cannot be recognized as a replacement for sex.

*"The executive order demands that we fit a spectrum into a nonexistent binary box," Maurine Neiman, Univ. of Iowa professor

Gender - Sex

- sex a multidimensional biological construct based on anatomy, physiology, genetics, and hormones.
- gender a social construct influenced by social, cultural, environmental, and behavioral factors.
- sex usually categorized as male or female, but variations occur.
- Differences in Sexual Development (DSD) term for those variations.
- gender usually categorized as boy or girl, man or woman

Dimensions of Sex and Gender



NIH Office of Research on Women's Health

Mental Health

Influences of Sex

One example of how sex influences mental health is that the sex hormones estrogen and progesterone play a role in increasing the activity of key signaling molecules (including dopamine and serotonin) that affect mood. Variations in these sex hormones likely contribute to differences observed between male and female incidence rates of depression, as well as responses to treatment.

LeGates et al., 2019. PMID: 30082889

Influences of Gender

There are many ways in which gender influences mental health. For example, dominant **norms** of masculinity—such as self-reliance and toughness—have been shown to negatively influence boys' and men's willingness to seek mental treatment. Gender-based violence (**power**, **relations**) is associated with an increase in post-traumatic stress, anxiety, and depressive disorders in women.

Riecher-Rössler, 2017. PMID: 27856397
Milner et al., 2019. PMID: 31690213

Female-Specific Conditions

Influences of Sex

Anatomical differences contribute to a higher prevalence of bladder infections in female patients. Because the female urethra is shorter than that of the male, bacteria have less distance to travel to reach and infect the bladder. In addition, the opening to the female urethra is closer to the rectum, a source of many bacteria that commonly cause bladder infections.

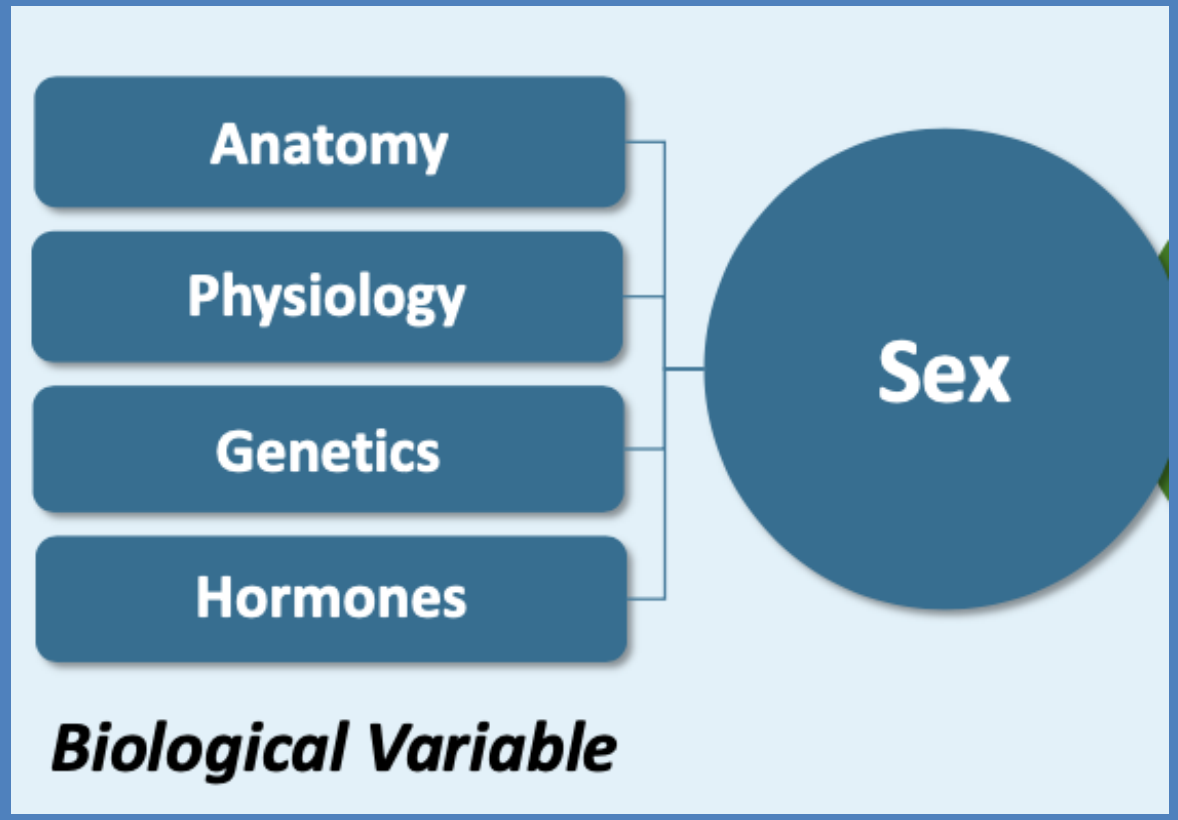
National Institute of Diabetes and Digestive and Kidney Diseases, "Definition & Facts of Bladder Infection in Adults"

Influences of Gender

Social and cultural stigma around menstruation is one example of how **gender norms** can impact health and wellbeing. For example, stigma around menstrual disorders and dismissal of women's pain as emotional rather than physical have been associated with delayed diagnosis of endometriosis (a menstrual disorder that affects roughly 10% of reproductive-age women) for as long as 11 years from the onset of symptoms, postponing treatment and the alleviation of symptoms.

Sims et al., 2021. PMID: 34360501

List several characteristics for each dimension of sex



Female Male

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SEX – NOT A BINARY BIOLOGICAL VARIABLE

Consider Differences in Sexual Development + all the 'normal' variations that occur within the main categories of male and female.

Sexual development is a very complex process with many genes, cells, and chemical messengers playing key roles.

“Your biologic sex is the interplay and collective of your sex chromosomes, sex hormones, internal reproductive structures and what gonads you have, and your external genitalia. It’s biologically false to say it’s any one of those things.”

Katie Barnes in *Fair Play*, 2023

Variability in human sexual phenotype is not the result of mistakes, or errors, in binary sex determination; rather it is evidence that there is no inherent, individual sexual binary to begin with.

Richard O. Prum in *Performance All the Way Down*, 2023

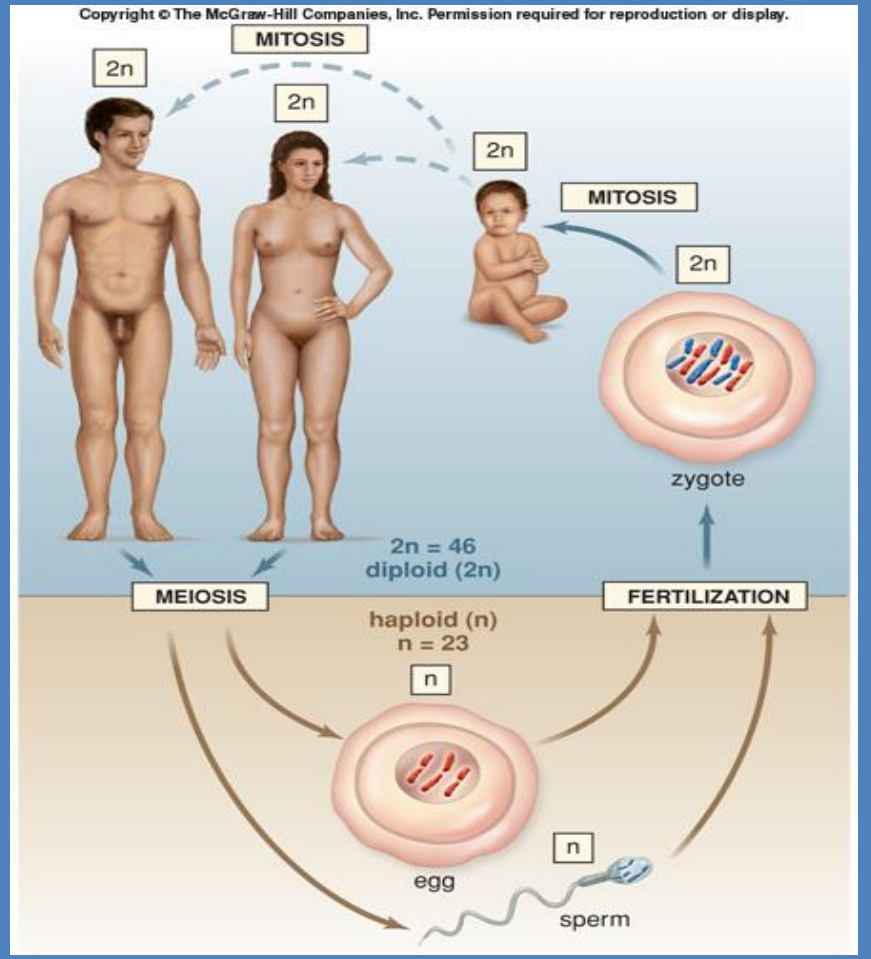
3 Definitions for Sex

- Chromosomal sex refers to the genetic makeup of the individual.
  - In humans, chromosomal sex is determined at fertilization/conception
  - We cannot change chromosomal sex.
- Gonadal sex is the presence of either testes or ovaries.
  - We can remove gonads.
- Phenotypic sex is the visible distinction between male and female.
  - We can alter phenotypic sex via hormone therapy and/or surgery.

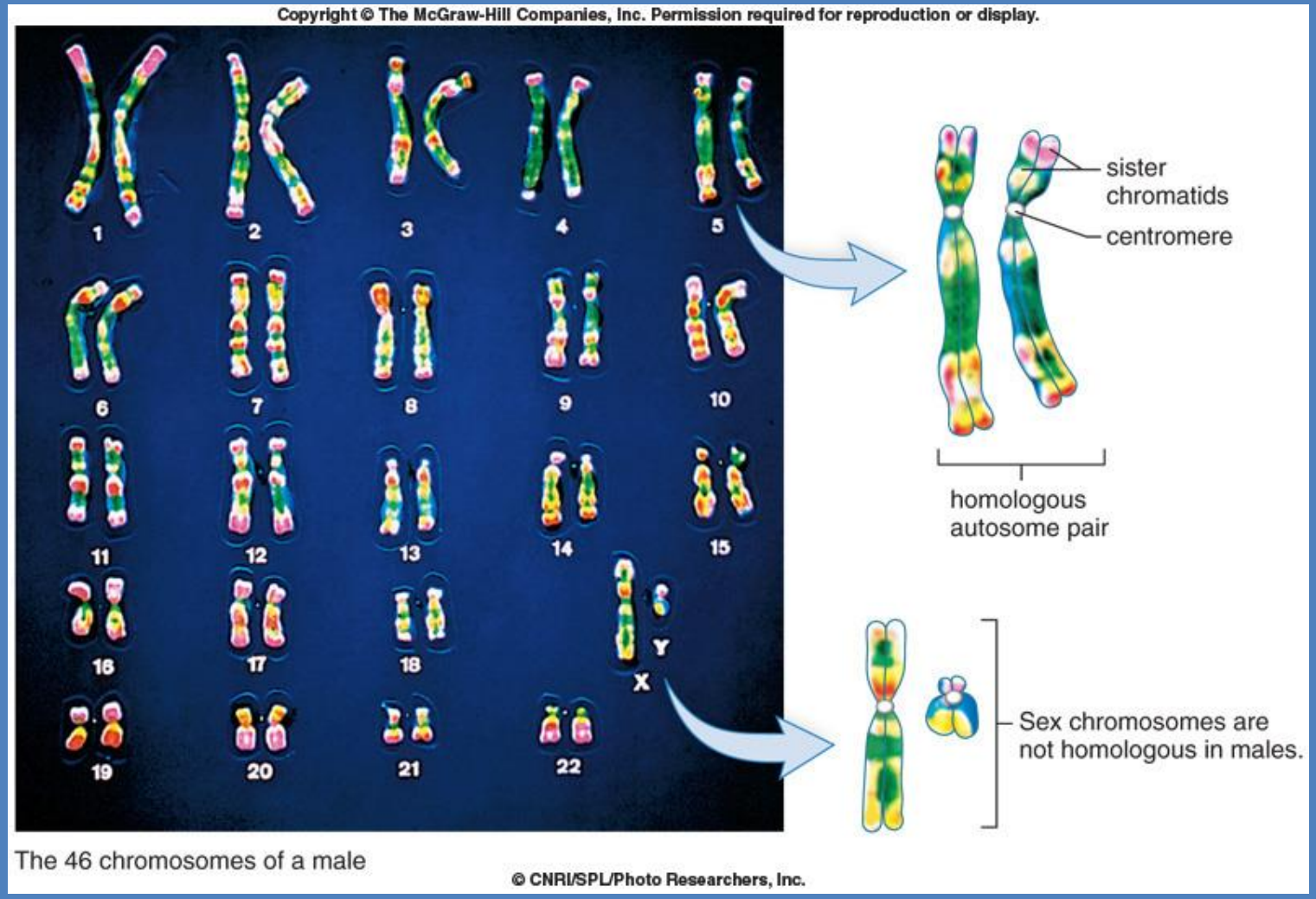
Human Life Cycle

Mitosis ensures every cell has a complete number of chromosomes with the same genetic information

Meiosis is used to make gametes. It reduces the chromosome number by half.



Human Karyotype



Sexual Development

Two distinct developmental processes

- Sex determination – inheritance of sex chromosomes establishes the sex of the individual
- Sexual differentiation – developmental process and pathway towards developing male or female phenotypes from undifferentiated embryonic structures
  - Typically develops along a pathway consistent with the chromosomal sex of the embryo

Klinefelter syndrome – 47,XXY
most common chromosomal DSD

A problem with X chromosome during meiosis in either parent

- Male genitalia and internal ducts - phenotypic male
- Under-developed testes that do not make sperm - infertile

Turner syndrome – 45,X

A problem with X chromosome during meiosis

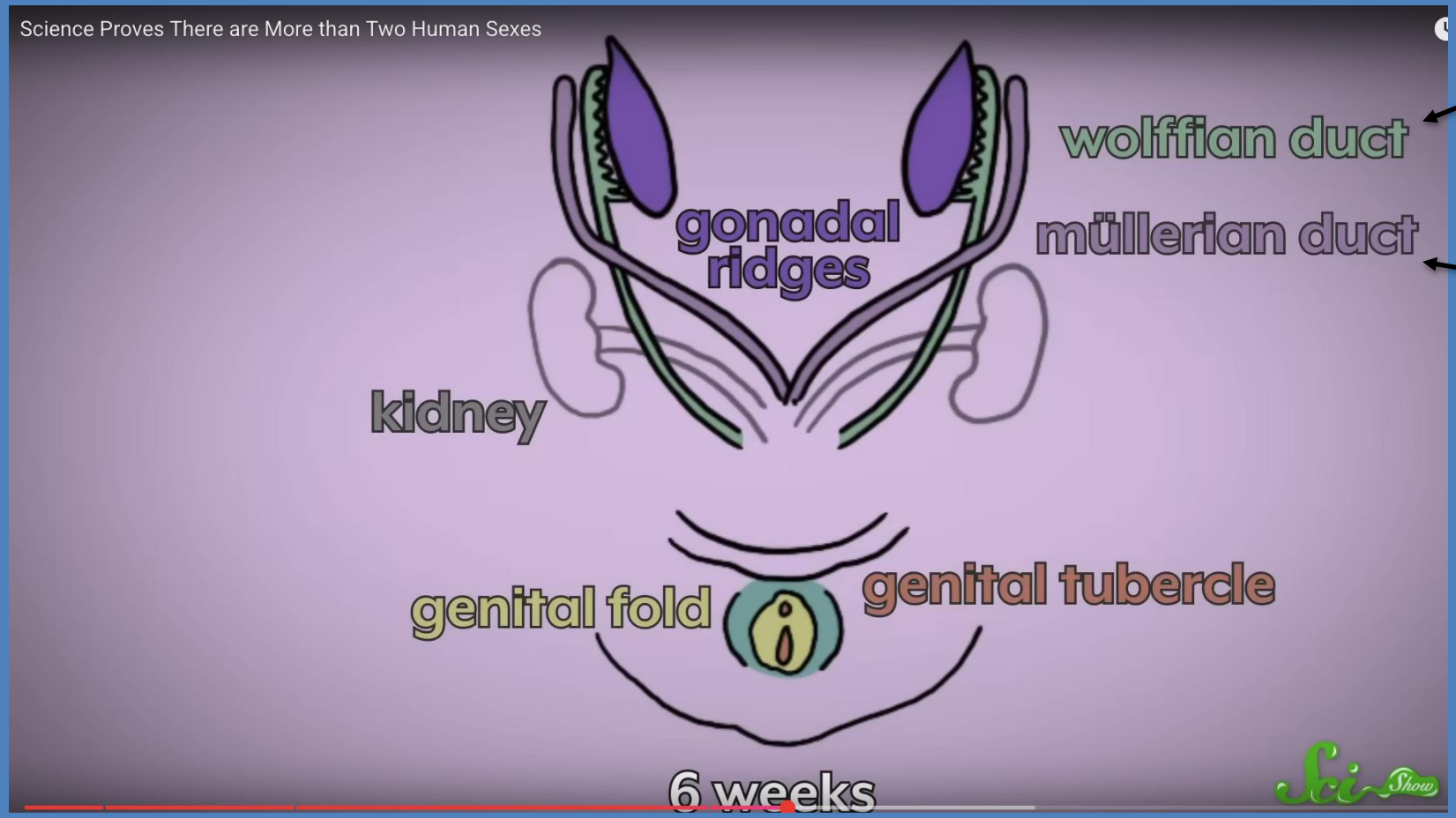
- Female genitalia and internal ducts – phenotypic female
- Under-developed ovaries - infertile

Sexual Development

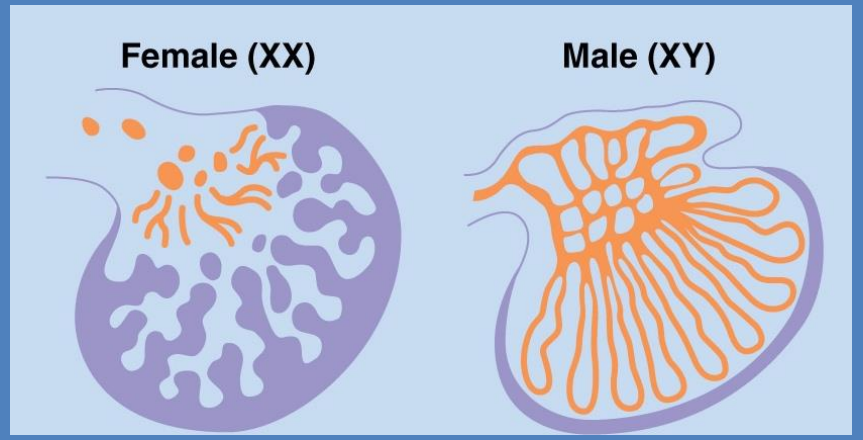
Two distinct developmental processes

- Sex determination – inheritance of sex chromosomes establishes the sex of the individual
- Sexual differentiation – developmental process and pathway towards developing male or female phenotypes from undifferentiated embryonic structures
  - Typically develops along a pathway consistent with the chromosomal sex of the embryo
  - At least 25 genes involved on various chromosomes

Prior to 6 weeks - No noticeable gonadal differences between males and females



Gonadal Differentiation

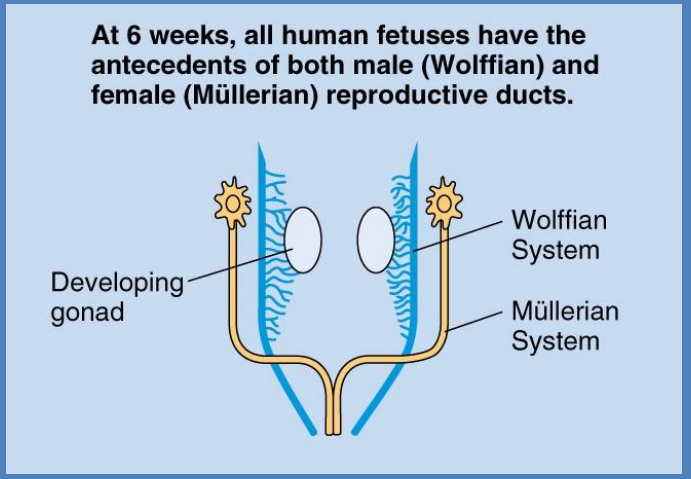


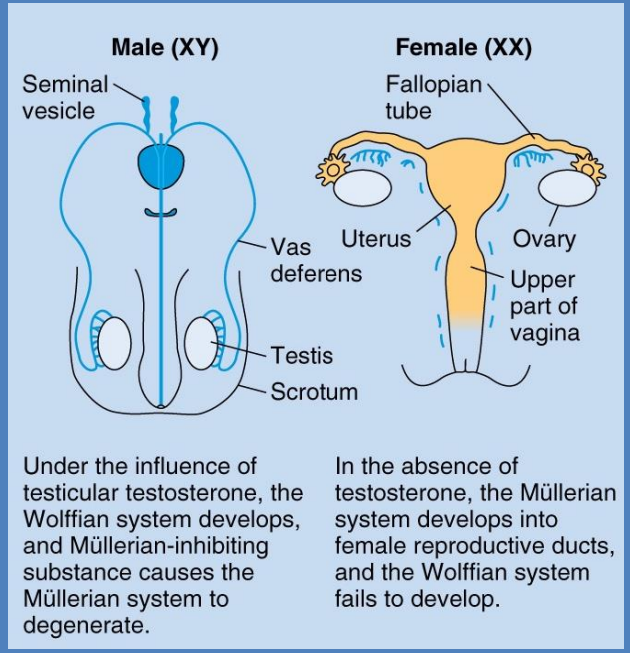
- About day 44, SRY gene on Y chromosome triggers development of testes in bipotential gonad
  - SRY gene sequence variation is most commonly observed genetic variation in XY individuals that fail to proceed to puberty & are usually considered to be females at birth & raised as girls
- About day 49, both autosomal genes & genes on X chromosome in bipotential gonad will contribute to ovary formation and block development of testes
- These discoveries have pointed to a complex process of sex determination, in which the identity of the gonad emerges from a contest between two opposing networks of gene activity.

Development of Ducts

By 3 months

- Males – testes secrete 2 hormones
  - Testosterone
    - Keeps & differentiates Wolffian system→ epididymis, vas deferens, seminal versicles
  - Mullerian-inhibiting substance (MIS)
    - Degrades Műllerian system
  - (Testosterone stimulates testes to descend into scrotum at about 9th month)
- Females – lack testosterone & MIS
  - Mullerian system differentiates → oviducts, uterus, upper part of vagina
  - Wolffian system degenerates





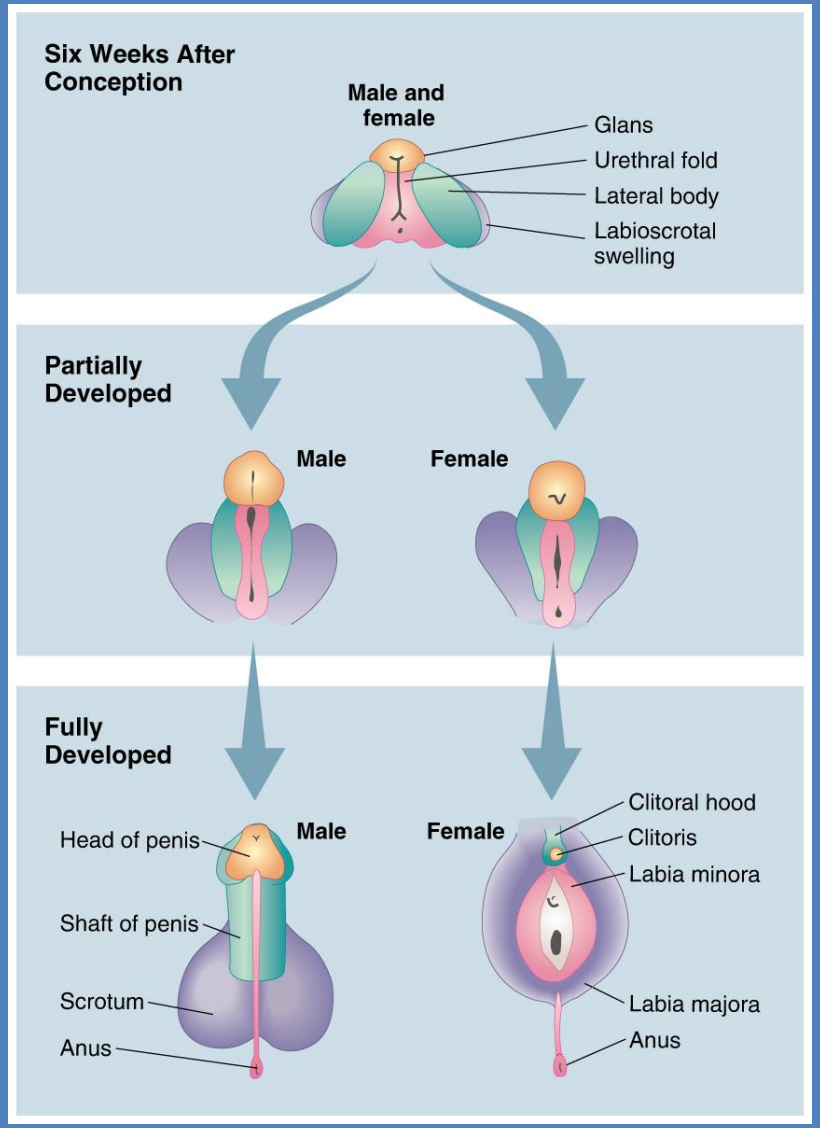
External Genitalia

In males by 14 weeks

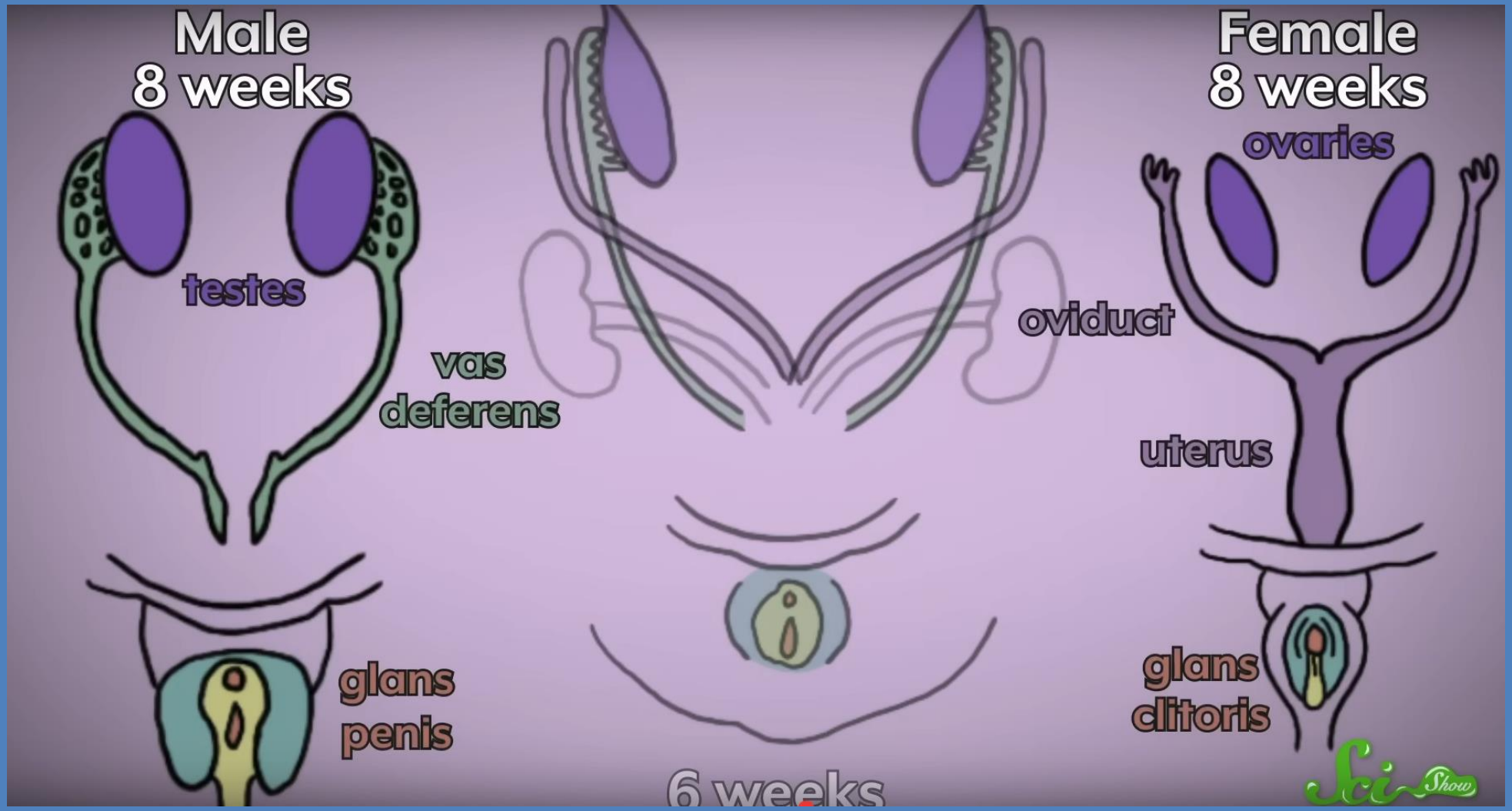
- Testosterone → DHT → penis, penile urethra & scrotum

In females events between 11 & 20 weeks

- No testosterone + maternal estrogens → clitoris, labia minora & labia majora



Gonads are homologs - derived from same embryonic structure



External genitalia are homologs - derived from same embryonic structure

Androgen insensitivity syndrome - 46,XY

- X-linked recessive mutation in androgen-receptor gene
- Testes secrete testosterone & MIS but no normal binding of testosterone to its receptor in target cells
- Usually not detected until no menstrual cycle at puberty

- Normal Testes, but internal; often removed to prevent testicular cancer
- Female external genitalia & vagina (not affected by androgen); but no uterus, uterine tubes, cervix, upper vagina (testes secrete MIS)
- Infertile & do not menstruate

Congenital adrenal hyperplasia – 46,XX or 46,XY

- A group of genetic disorders that affect the adrenal glands
- Lack the enzyme needed to produce 3 major hormones resulting in
  - Not enough cortisol and/or aldosterone
  - Too much androgen
- Is a real medical emergency in newborn – can lead to CV collapse and other health problems.

- Most common cause of DSD in people with XX chromosomes
  - Ambiguous genitalia with enlarged clitoris (may look like penis and scrotum); uterus & ovaries not affected
- Does not cause DSD in XY individuals; may have early puberty if not treated → shorter stature

In 2nd half of pregnancy

Hypothalamus becomes male or female

- Testosterone "masculinizes" the hypothalamus
- An "organizing" effect – irreversible effect
- "Activation" events occur later at puberty

How?

Research evidence is inconclusive

- In humans, testosterone probably acts directly on the brain
- But, testosterone also acts on the brain by being converted to estrogen by the enzyme aromatase
- Without exposure to testosterone, the brain is not masculinized.
- Both testosterone & estradiol may be needed to masculinize the human brain.

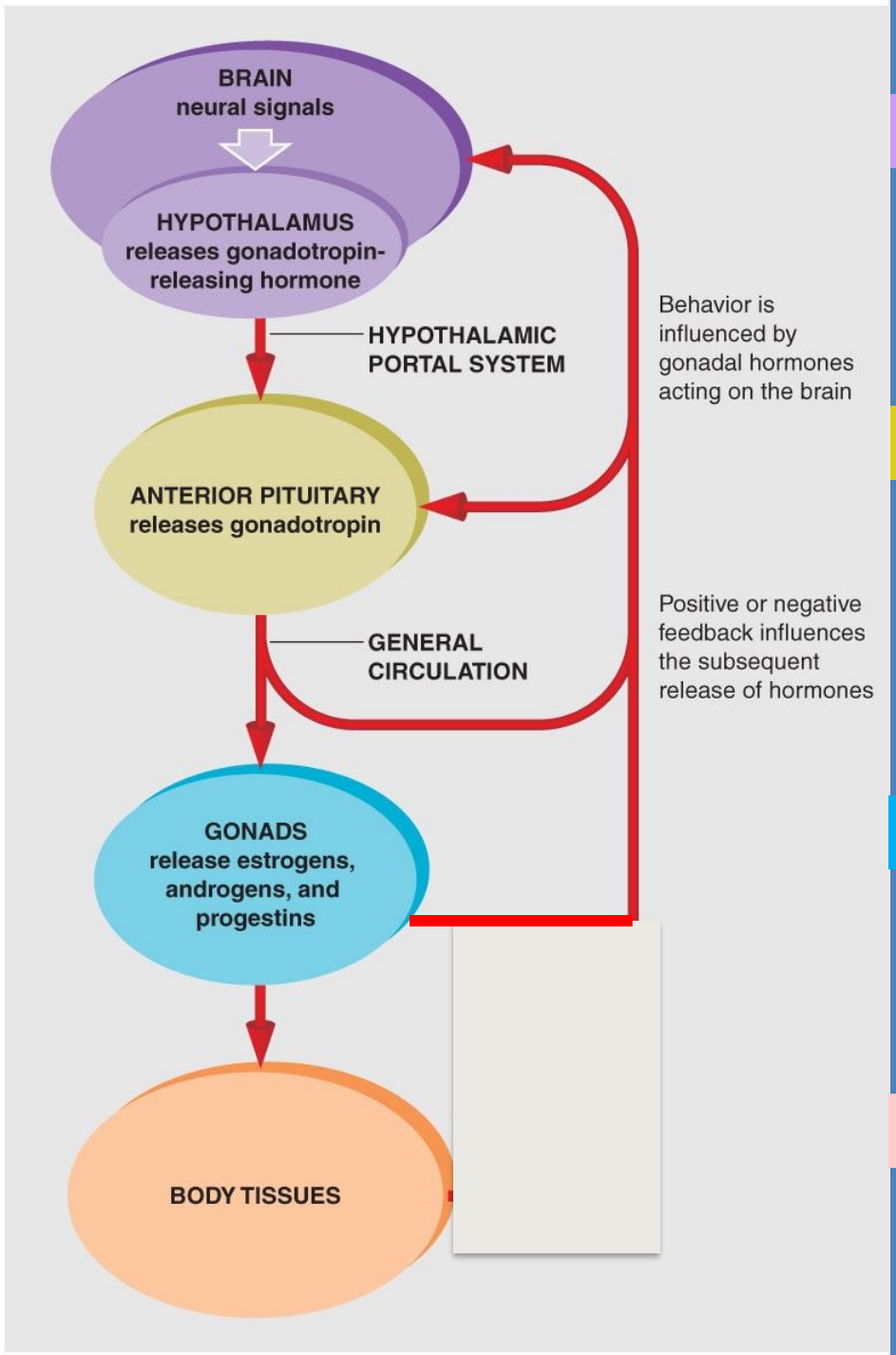
Brain differences

- Structural differences result from interaction between hormones & developing brain cells
- Major bases of sex differences in behaviors:
  - Gender role
  - Gender identity
  - Sexual orientation
  - Sex differences in cognition, aggressive behavior, language organization

Sexual differentiation of genitals and of brain occur at very different stages

“Sex” Hormones After Birth

Increased secretion of hormones at puberty → “Activation” effects



Hypothalamus releases

- GnRH (Gonadotropin releasing hormone)

Anterior Pituitary releases Gonadotropins

- FSH (Follicular Stimulating Hormone)
- LH (Lutenizing Hormone)

Gonads: Testes & Ovaries release Sex Steroids

- Androgens (testosterone) & estrogens, progestins

Body Tissues respond to sex steroids

- E.g. secondary sex characteristics

Effects of Estrogens in Females

At puberty:

- Induces female secondary sex characteristics Examples?
- Growth of ovary & follicles (local effect)
- Growth & development of female reproductive tract & external genitalia

Low circulating levels of androgens from adrenal cortex help with

- Pubic & axillary hair development during puberty
- Skeletal muscle and bone growth during puberty
- Maintenance of sex drive
- Most androgens are converted to estradiol (a type of estrogen) by enzyme aromatase

Menopause – after 1 year without periods; low levels of estrogens & progestins

Effects of Androgens (Testosterone) in Males

At puberty:

- Induces male secondary sex characteristics Examples?
- Growth and development of male accessory reproductive organs and maintenance of their function
- Stimulates protein anabolism (synthesis), bone growth, & cessation of bone growth

Throughout life

- Required for sex drive
- Required for sexual performance

Andropause – slow decrease in testosterone levels later in life

SEXUAL ORIENTATION
and
GENDER IDENTITY

Sexual Orientation & Gender Identity

- Sexuality is one's sexual feelings, thoughts, attractions and behaviors towards other people.
- Sexual orientation constitutes the stable sexual attraction toward the opposite sex (heterosexuality), the same sex (homosexuality), or both sexes (bisexuality), or showing no interest in individuals of either sex (asexuality) after maturity.
- Gender identity represents the concept that individuals perceive themselves as male, female, a blend of both, or neither. This may change throughout their life and may or may not correspond to a society's cultural expectations based on their biological sex traits.
- Sexual behavior refers to the actual sexual interactions performed by the individual.
- Sexual orientation and gender identity refer only to humans

Some people believe that sexual orientation, e.g. homosexuality, is a social construct. What does that mean, and what possible consequences arise from this belief?

- Social construct = sexual orientation develops after birth, based on interactions with family, friends, society; therefore it is a choice and can be changed.
- This leads to bigotry, hatred, attempts to "re-educate"
- Conversion therapy to change sexual orientation or gender identity can cause significant trauma.

Scientific evidence supports the idea that sexual orientation is affected by fetal hormones and has a genetic component

- More common in gay brothers/identical twins/lesbian sisters/relatives of same maternal line.

Gender Diversity

- Gender diversity refers to the extent to which a person's gendered behaviors, appearance and identities are culturally incongruent with the sex they were assigned at birth

- cisgender one's gender identity corresponds with sex assigned at birth
- transgender one's gender identity does not correspond with sex assigned at birth
- nonbinary one does not subscribe to conventional gender categories but identifies with neither, both, or a combination of genders.

- "The increase in prevalence and visibility of Sexual and Gender Diverse (SCD) populations illuminates the need for greater understanding of the ways in which current laws, systems, and programs affect their well-being." *NAS report 2020*

Communities included in the "strong LGMTTTQQIAA" acronym

Usually see
LGBTQ+
or
LGBTQA+

>11 million, self-identified LGBT individual living in US.
~population of Ohio.
NAS 2020

Based on Sexual Orientation	**Based on Gender Identity/Expression**
Lesbian	+ **A**gender
Gay	+ Bigender
Bisexual	+ Genderqueer
2/**T**wo-Spirit	+ Gender Variant
Queer	+ Nonbinary
Questioning	+ Pangender
Intersex	+ **T**ransgender
Asexual	+ **T**ranssexual
Pansexual	

What do
"trans woman"
&
"transmasculine youth" mean?

Three elements of gender

- Gender identity is who you are. An internal element.
- Gender presentation is one's appearance and how they show up in the world. An external element.
- Pronouns are personal and meaningful. An external element.

Gender Dysphoria

- The cause of gender dysphoria is unknown, but is likely due to an interaction of biological, psychological and societal factors.
- It is NOT a mental disorder.
- Although biological sex does have some effect on the brain and its function, it does not have nearly enough physical identifiers for there to be designated male and female brain structures. *Dr. Lise Eliot, a neuroscientist at Rosalind Franklin University*

- Before puberty, gender-affirming care is about supporting the *process* of gender development.
- The current research suggests that, rather than predicting or preventing who a child might become, it's better to value them for who they are now—even at a young age.
  Dr. Jason Rafferty, pediatrician & psychiatrist at Hasbro Children's Hospital in RI

Stigma

- SGD populations are affected by stigma at individual, interpersonal, & structural levels
- Structural stigma includes institutional policies & practices + public attitudes
  - Contributes to inequalities affecting SES well-being, physical & mental health, and physical safety
- SGD youth & adults are at higher risk of depressive symptoms, anxiety & suicidality

- "In 2020 the Supreme Court held that discrimination based on sexual orientation or gender identity is prohibited by Title VII, the federal law that is part of the 1964 Civil Rights Act." *NAS report 2020*

A Safe Environment to Explore Gender

- Parent connectedness & support is associated with greater resilience among teens and young adults who are transgender or gender-diverse.
- Support in schools by teachers, coaches, counselors, classmates
  - Protection against bullying & discrimination
  - Professional education & training improve & promote positive school climate
- Friendships
- Respecting pronouns and not “deadnaming” – using birth name, which is required on the ballot to run for office in some states

Medical Diagnosis

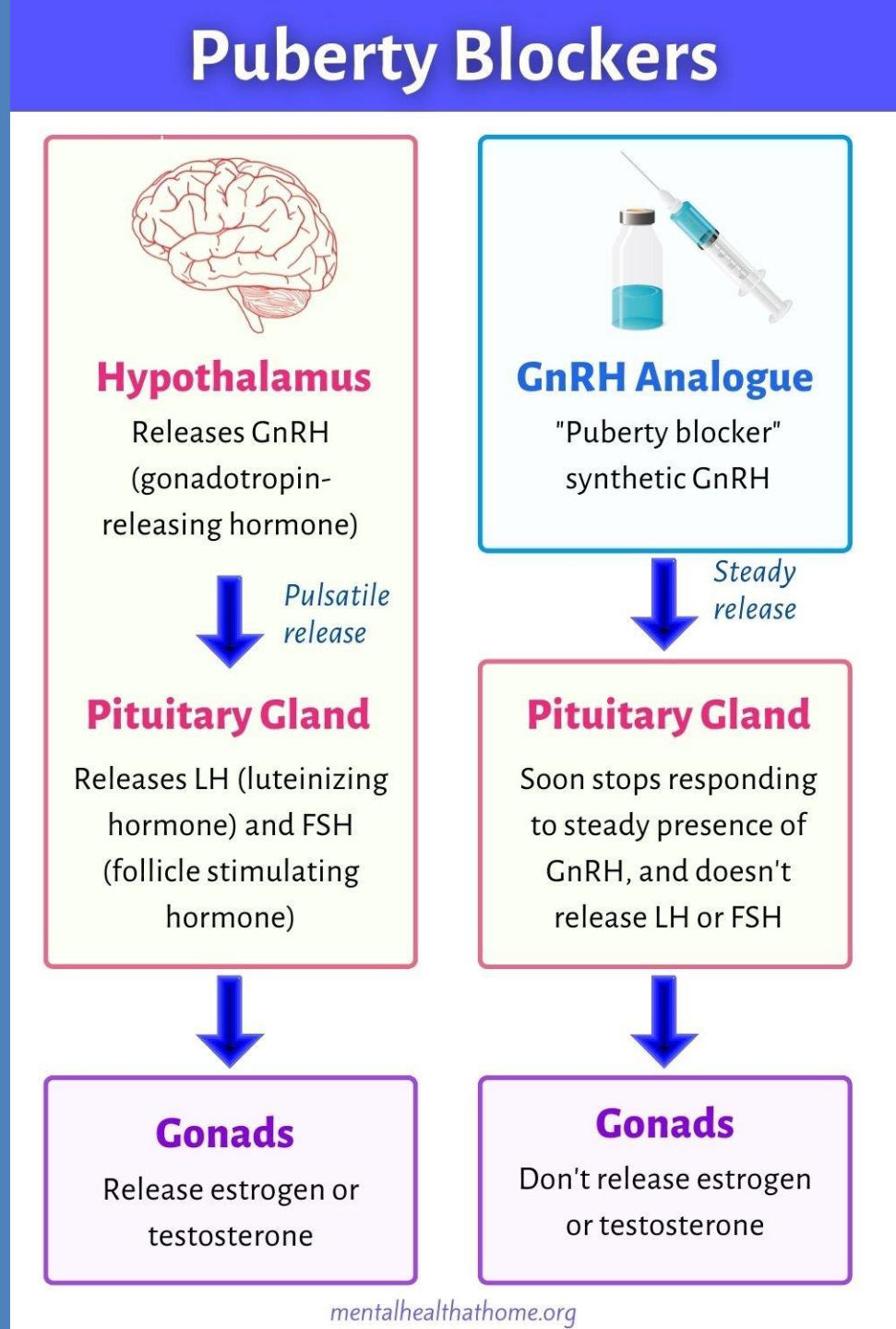
- A gender therapist has to diagnose the young person with gender dysphoria.
- After a diagnosis, and only if earlier conversations suggest that hormones are indicated, guidelines call for discussion of fertility, puberty suppression and hormones. *NAS report 2020*
- Gender-affirming care for SGD people is an essential intervention to improve health and well-being.
- It needs to be individualized and conducted in partnership between patients and their providers.

Age-Appropriate Gender-Affirming Care

- Major medical organizations have published policy statements and guidelines on how to provide age-appropriate gender-affirming care.
  - American Academy of Pediatrics (AAP), the American Academy of Child and Adolescent Psychiatry, the Endocrine Society, the American Medical Association, the American Psychological Association and the American Psychiatric Association
- These medical societies find such care to be evidence-based and medically necessary.

Age-Appropriate Gender-Affirming Care Guidelines

- No hormonal differences among prepubertal children
- No puberty blockers or hormones used until already undergoing puberty for their sex assigned at birth.
- Puberty blockers used when already into the 2nd of 5 puberty stages—marked by breast budding & pubic hair. Given if a teen is not ready to make decision about puberty. (Off-label use for gender dysphoria. Used for years to treat precocious puberty.)
- Access to gender-affirming hormones & potential access to gender-affirming surgery is available at age 16. Only surgery available is mastectomy.
- Genital surgery is NOT recommended for minors.



Gender-Affirming Care cont.

Recommend a maximum of 2 years on puberty blocker therapy, which pauses rather than prevents puberty.

- Histrelin 50mg implant ($56,872 for a 1 year dose) or
  Lupron Depot Pediatric 11.25 mg (injected every 3 months @ $13,487/dose = $53,948/yr)
- Side effects: lower bone density, weight gain, hot flashes, mood swings
- Side effects & delay of puberty are reversible.

Gender-affirming hormones

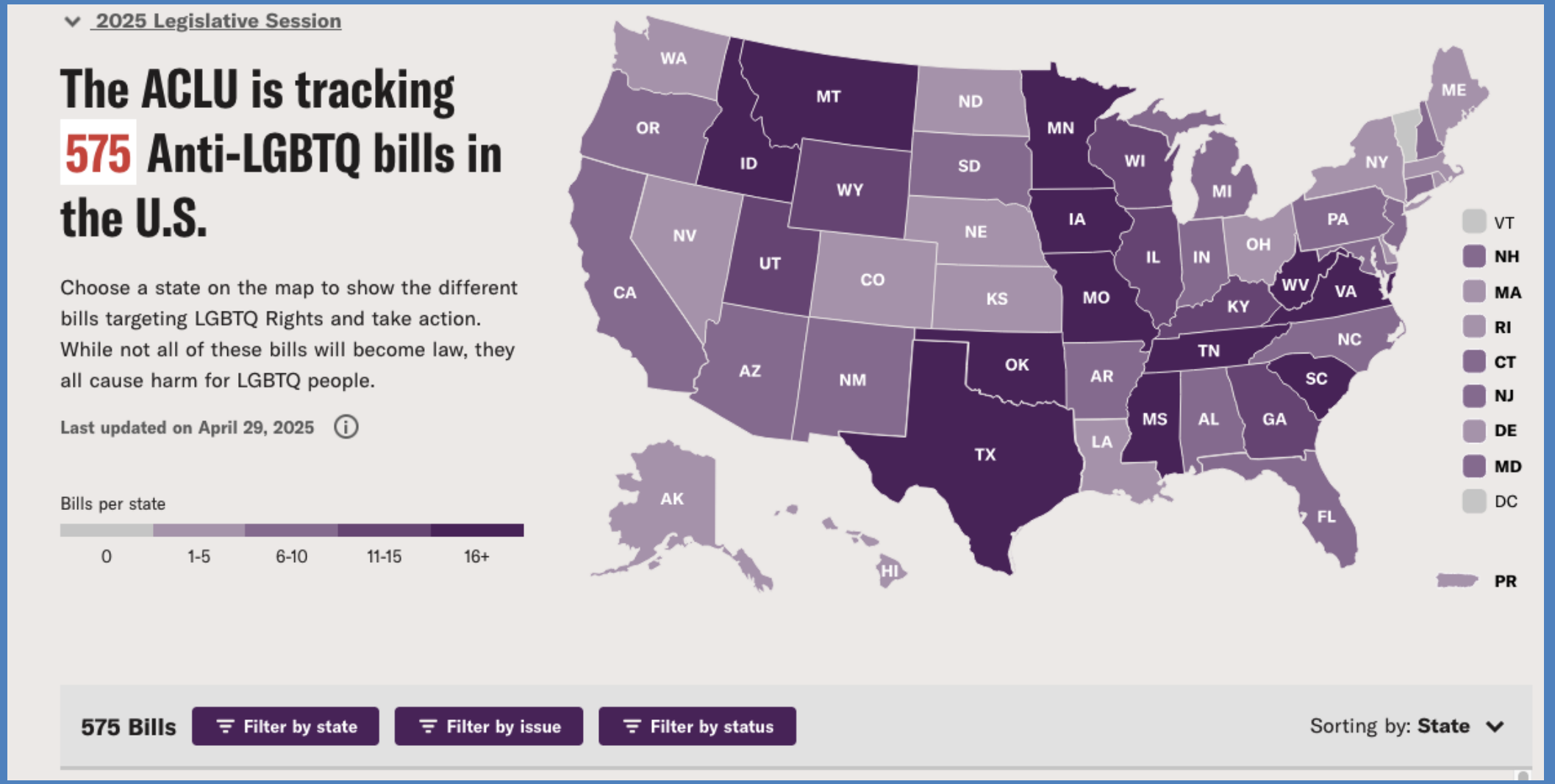
- For transfeminine teens/adults – oral estrogen + GHRHa to block release of androgens → bodily changes
- For transmasculine teens/adults – testosterone IM → stops menstrual cycle + bodily changes

Medicare started covering gender-affirming care in 2014. Insurance programs that receive federal funding, including Medicaid, are required to cover gender-affirming care. *NAS report 2023*

Mental Health

- Effects of denying gender-affirming care are worse than whatever side effects result from delaying sex-assigned-at-birth puberty.
- Without gender-affirming hormone therapy, cisgender hormones take over, forcing body changes that can be permanent and distressing.
- Delays in prescribing puberty blockers and hormones may in fact worsen mental health symptoms for trans youth.
- If a mental health issue exists for a gender diverse child, it most often stems from stigma and negative experiences, rather than being intrinsic to the child's gender identity.
- Gender-affirming care is based on evidence while prohibitions on gender-affirming care are based in opinion.

For Iowa, ACLU lists 20 bills: 19 advancing; 1 passed into law



https://www.aclu.org/legislative-attacks-on-lgbtq-rights-2025

U.S. State Laws Directed at SGD Individuals

- Many states' bills are directed at transgender youth
  - Bar classroom discussion of gender identity
  - Block access to gender-affirming care to help young people transition
  - Restrict trans girls participation in sports
- Take away parental rights of parents with whom lawmakers disagree
- Families with SGD children are moving out of these states so their children can receive gender-affirming care

April 2021 AMA letter to National Governors Association

"Decisions about medical care belong within the sanctity of the patient-physician relationship, …We believe it is inappropriate and harmful for any state to legislatively dictate that certain transition-related services are never appropriate and limit the range of options physicians and families may consider when making decisions for pediatric."

SPORTS

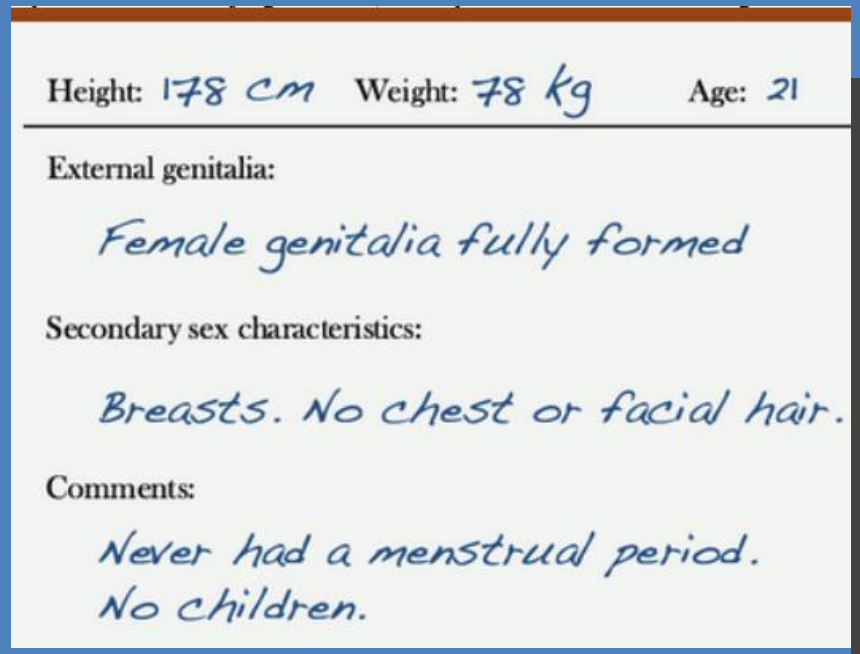
TRANSGENDER & DSD INDIVIDUALS

Men are thought to be better athletes because of typically higher testosterone levels. But there's an overlap in levels between the sexes, and testosterone levels do not predict athleticism. (Not all tall people are good at basketball.)

Trans boys/men are competing in either women's or men's sports, often unnoticed. Belief that someone assigned female at birth would not be competitive among those assigned male at birth, therefore not a threat. After starting testosterone treatment, they can only play on men's teams; if they transition without medical treatment, they can stay on women's teams.

Trans girls/women are viewed as threats to girls'/women's sports because of their sex assigned at birth and the perception of competitive advantage.

Sprinter (HHMI case study)



Height: 178 cm Weight: 78 kg Age: 21

External genitalia:

Female genitalia fully formed

Secondary sex characteristics:

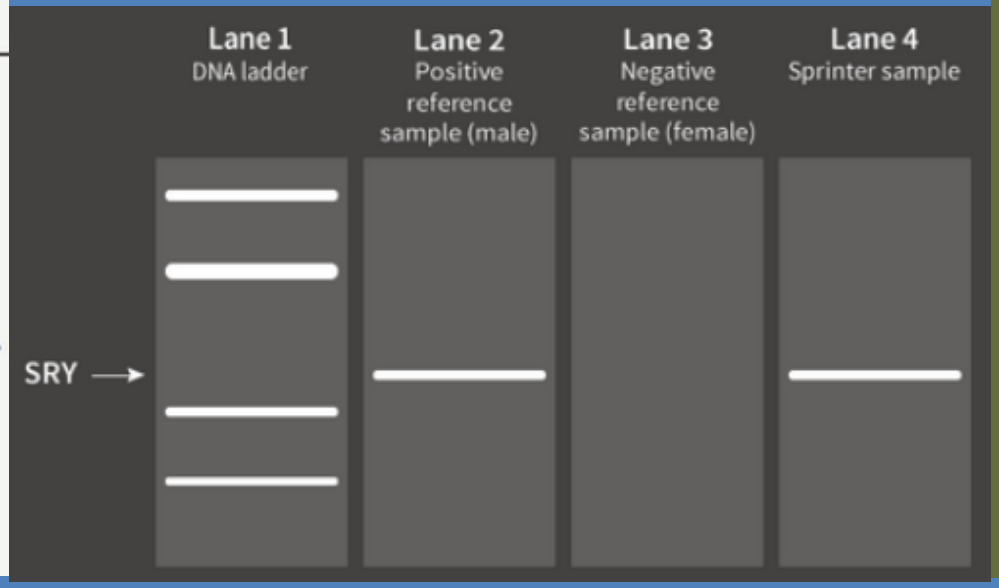
Breasts. No chest or facial hair.

Comments:

Never had a menstrual period.
No children.

1966

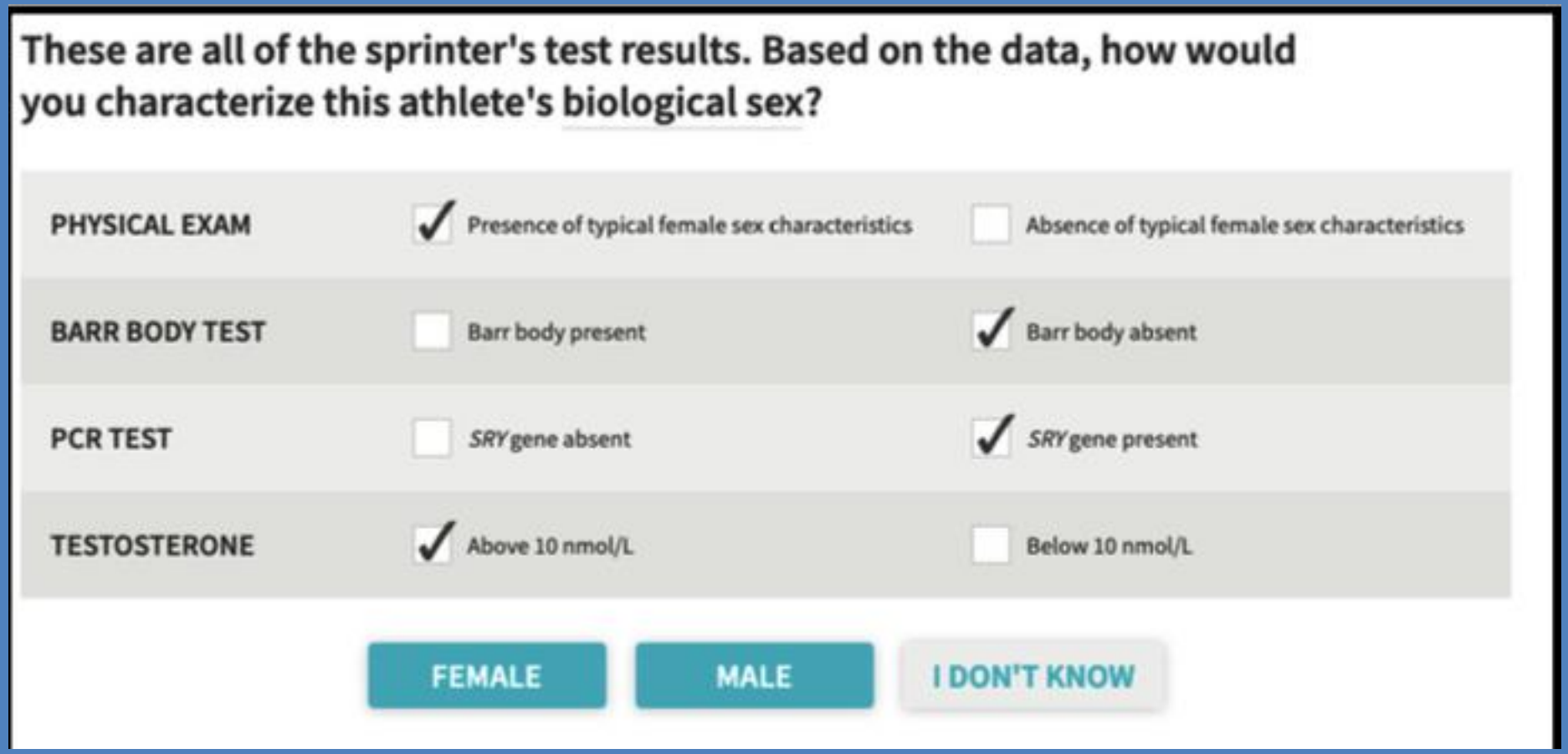
1968 - No Barr body



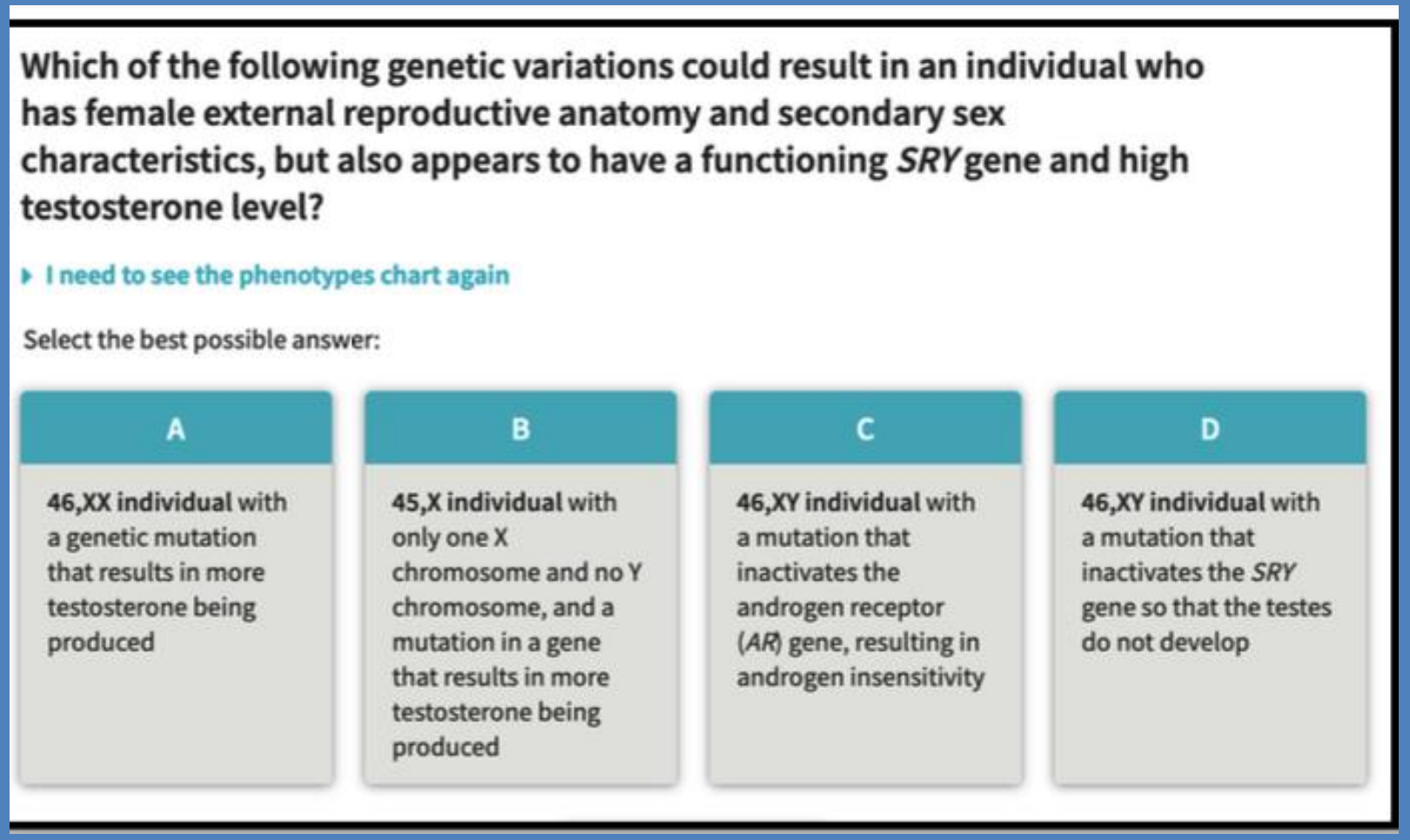
1992

2011
<10nmol

Sprinter


These are all of the sprinter's test results. Based on the data, how would you characterize this athlete's biological sex?
PHYSICAL EXAM
Presence of typical female sex characteristics
Absence of typical female sex characteristics
BARR BODY TEST
Barr body present
Barr body absent
PCR TEST
SRY gene absent
SRY gene present
TESTOSTERONE
Above 10 nmol/L
Below 10 nmol/L
FEMALE
MALE
I DON'T KNOW

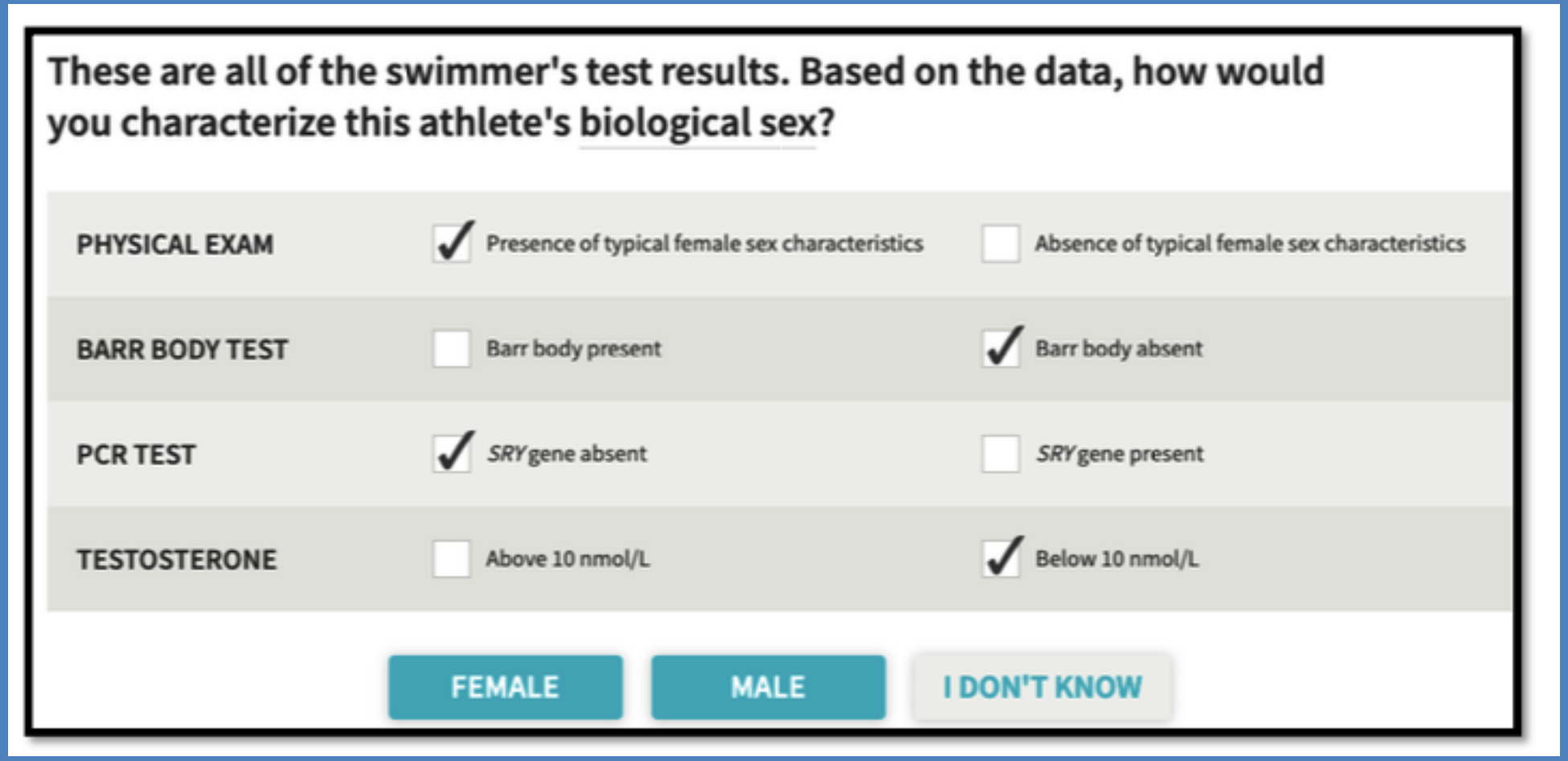
Sprinter



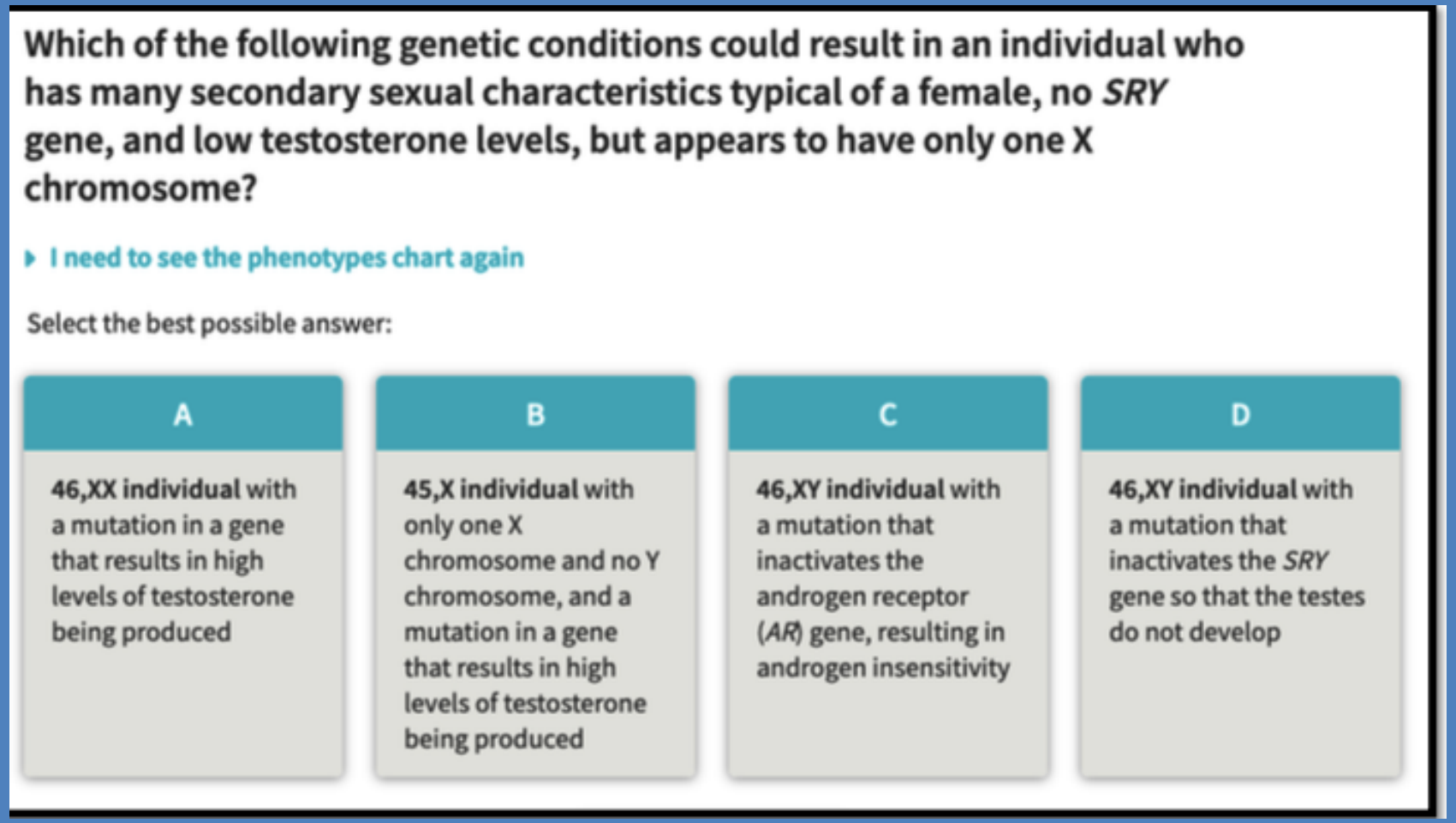
Answer C - 46,XY with androgen insensitivity

This athlete would be allowed to compete because although they have high testosterone levels, their body does not appear to respond to the hormone as indicated by the female reproductive anatomy.

Swimmer (HHMI case study)



Swimmer



Answer D Since the *SRY* gene is not present, testes would not develop. Under current regulations, this athlete would be allowed to compete because their testosterone levels are within the accepted range.