

Chemicals and Reproductive Health

FOOD PACKAGING FORUM 2021 WORKSHOP

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OCTOBER 6, 2021



THE ROADMAP



The Problem

Its Causes

Its Consequences

Its Solutions

THE ROADMAP



The Problem

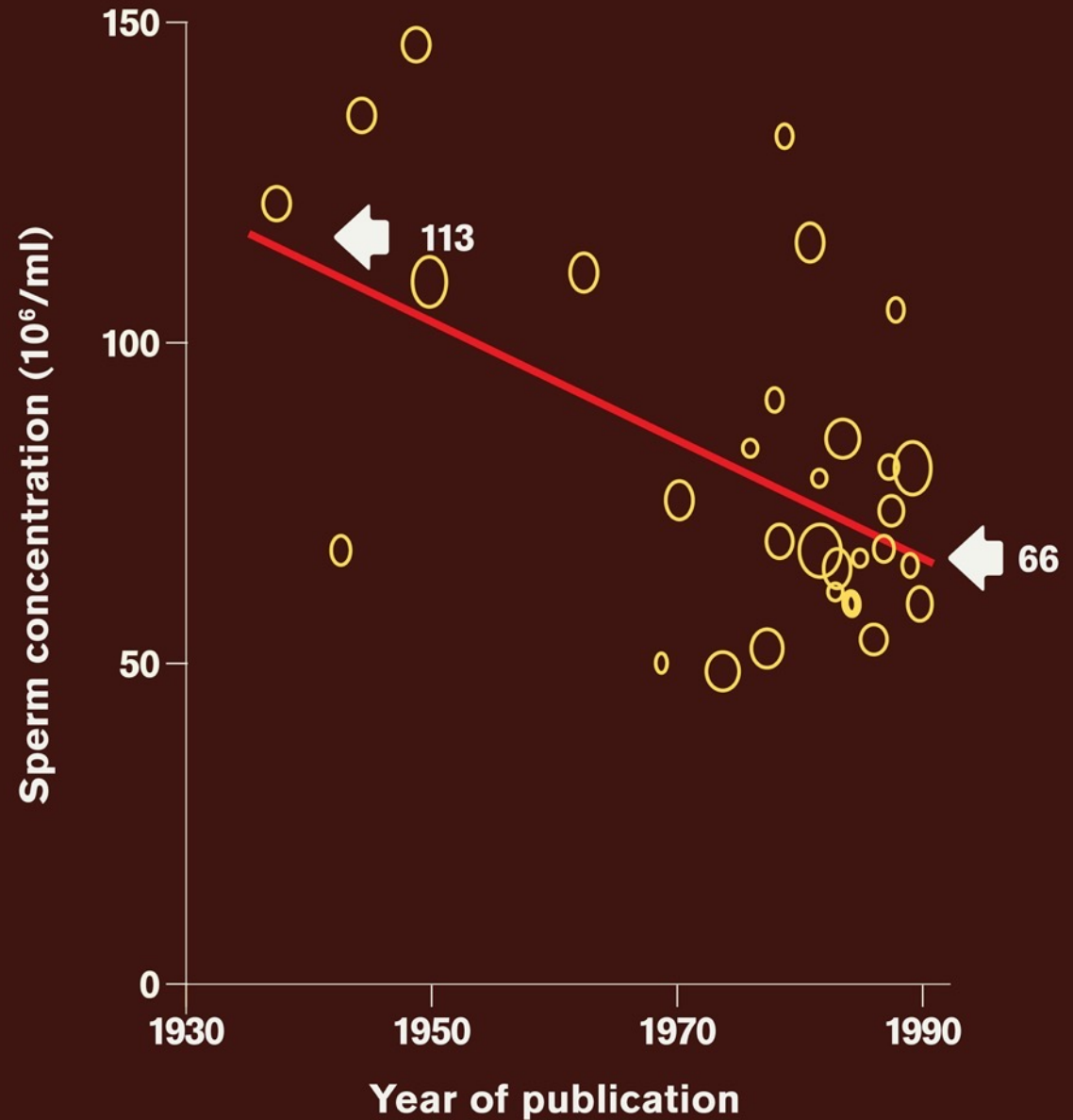
Its Causes

Its Consequences

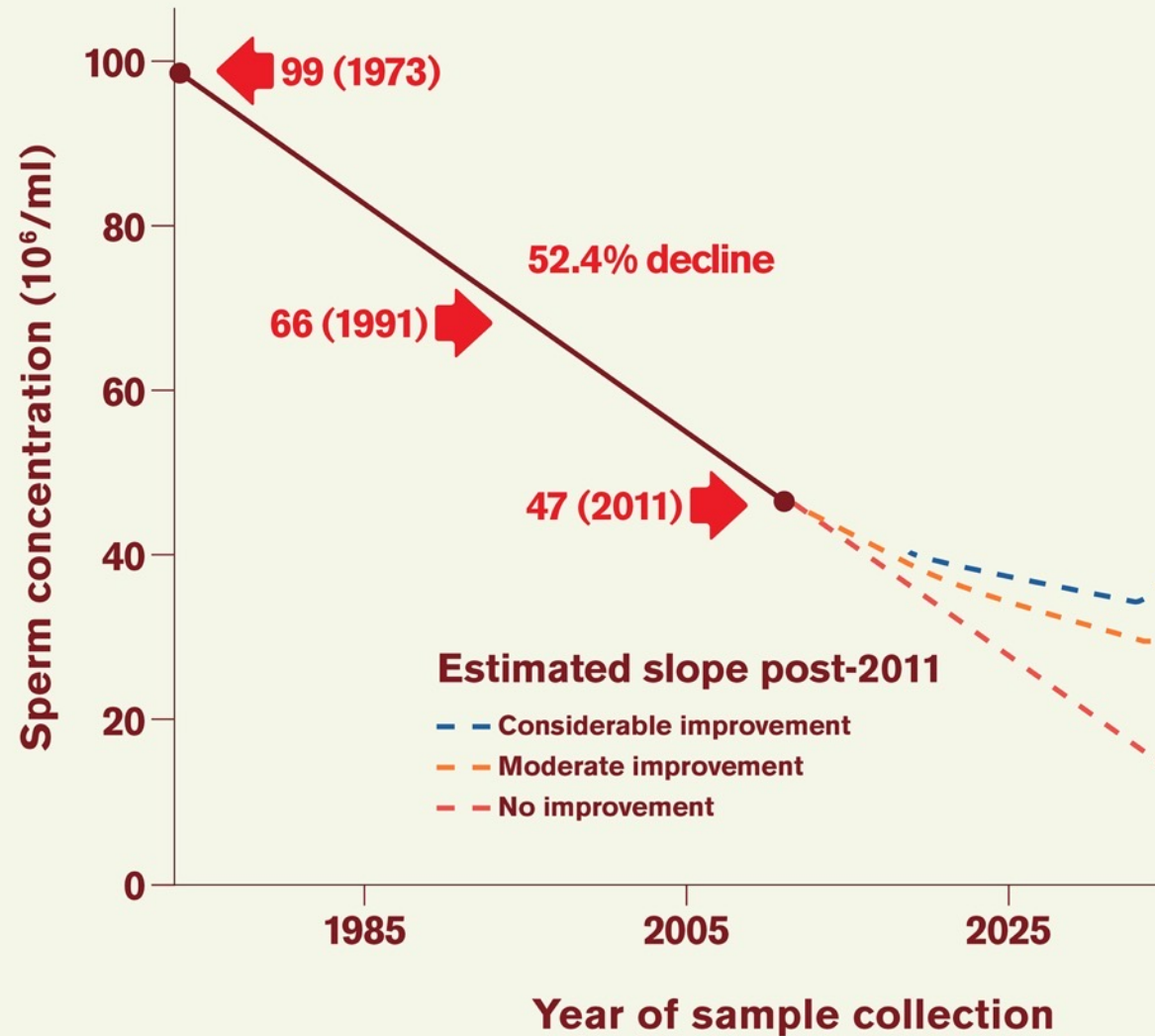
Its Solutions

“There has been a genuine decline in semen quality over the past 50 years”

CARLSEN ET AL, 1992

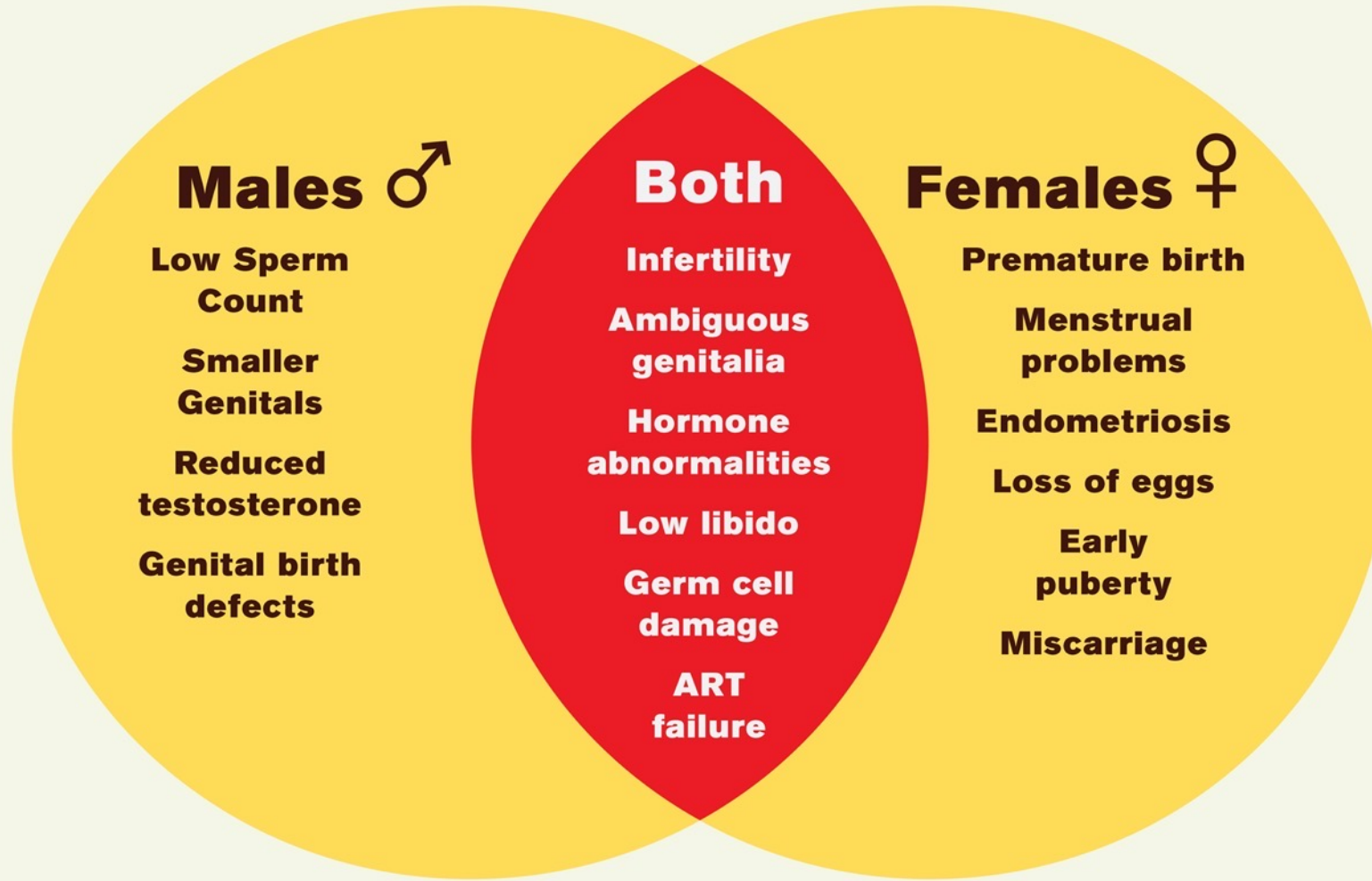


Sperm Concentration in Western Countries



ADAPTED FROM LEVINE ET AL 2017

Reproductive Problems in Men and Women



THE ROADMAP

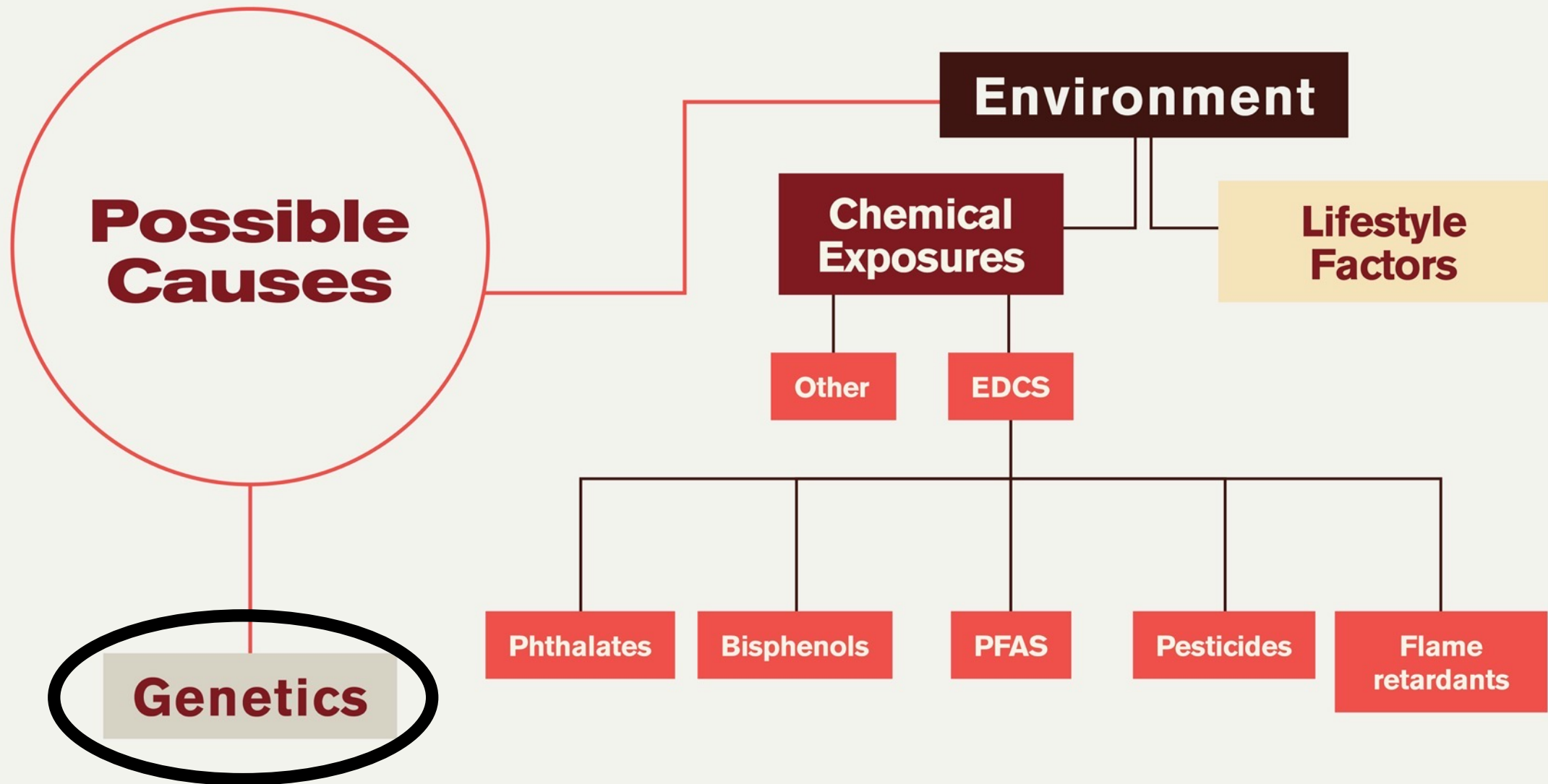


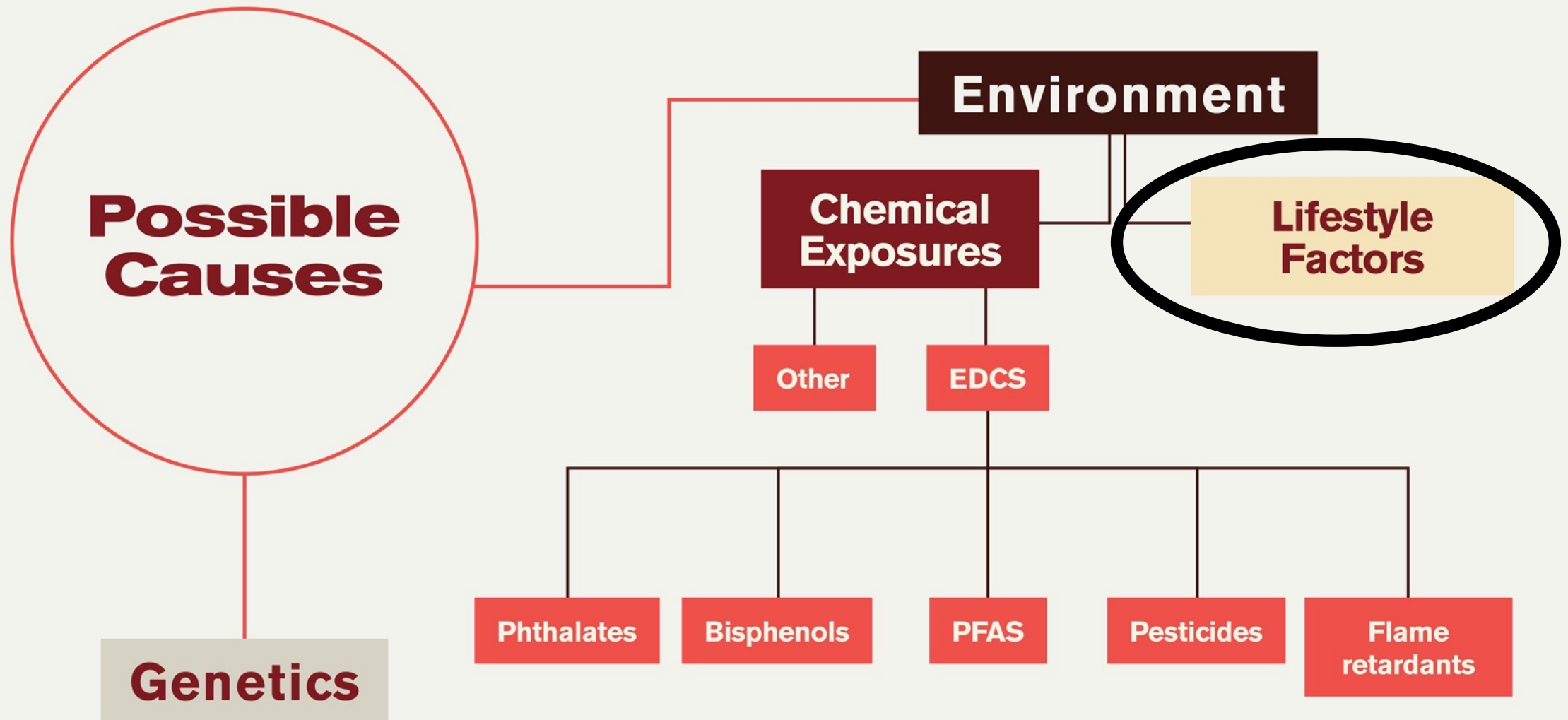
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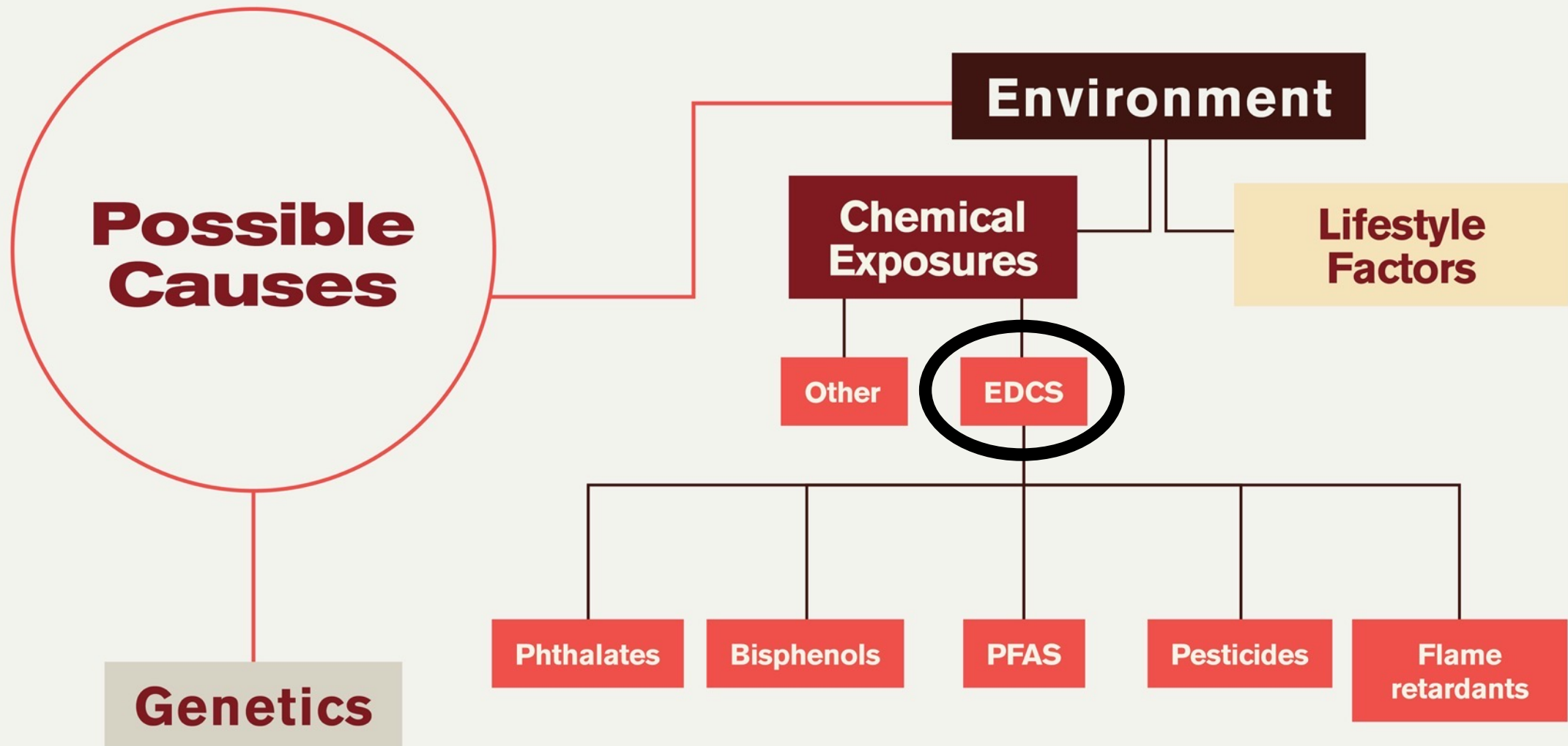
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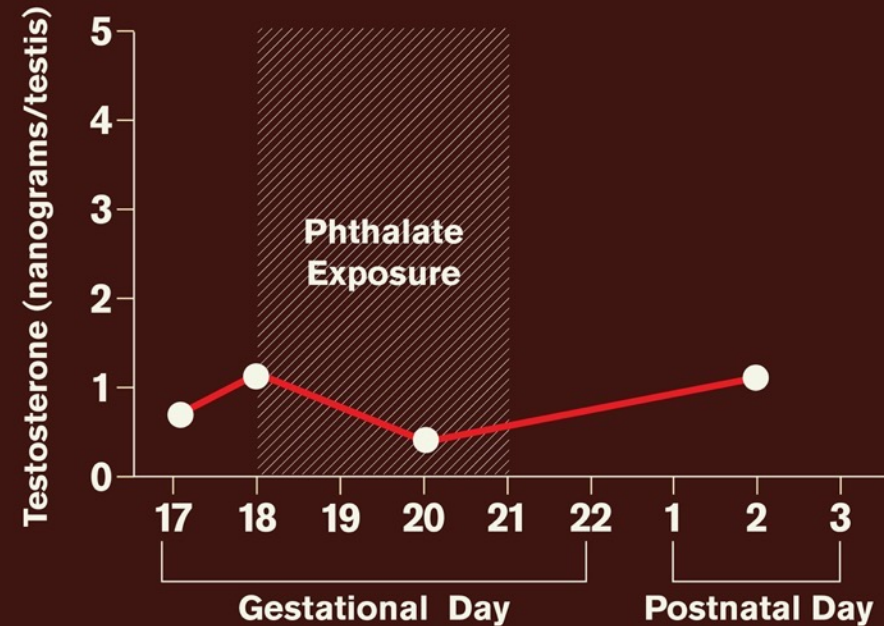


Prenatal Phthalate Exposure Lowers Fetal Testosterone

Unexposed mom

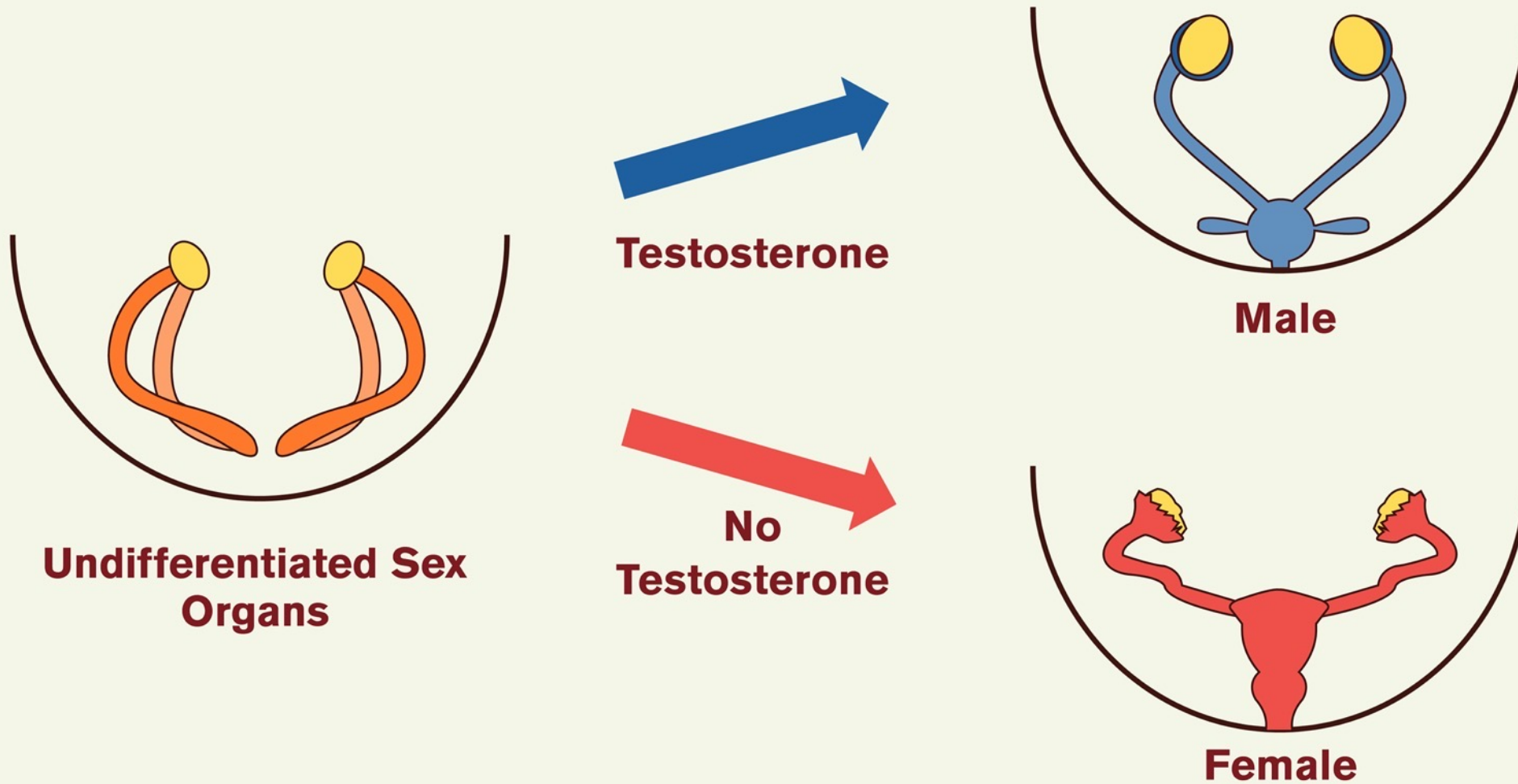


Mom with Phthalates



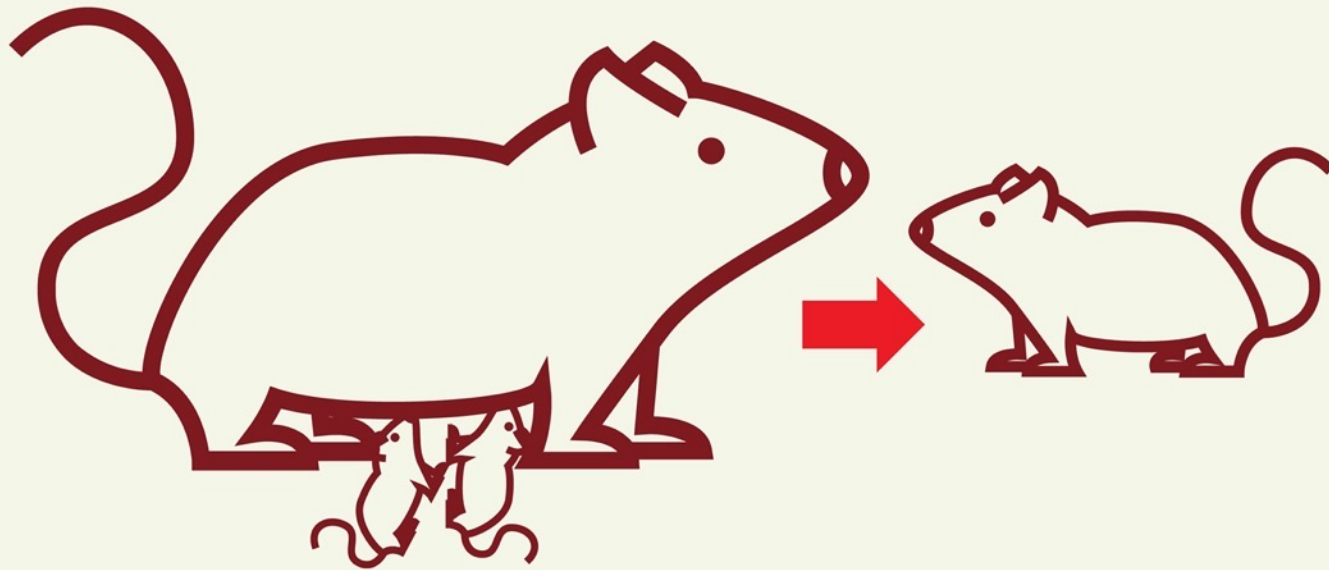
PARKS ET AL. 2000 TOXICOL. SCI

Genital tract development depends on testosterone



Prenatal Phthalate Exposure Disrupts Male Genital Development

DEHP



Phthalate Syndrome

- Smaller penis
- Malformed penis
- Undescended testicles
- Shortened AGD

FOSTER 2005 INTERNATIONAL JOURNAL OF ANDROLOGY

**Urinary
phthalate
metabolites**



**testicular
descent**



penile width

AGD

scrotal size

We confirmed this hypothesis in two human studies (2005 & 2015)

Research | Children's Health

Decrease in Anogenital Distance among Male Infants with Prenatal Phthalate Exposure

**Shanna
Catherin
the Stud**

Human Reproduction, Vol.0, No.0 pp. 1–10, 2015

doi:10.1093/humrep/deu363

human
reproduction

ORIGINAL ARTICLE *Reproductive epidemiology*

First trimester phthalate exposure and anogenital distance in newborns

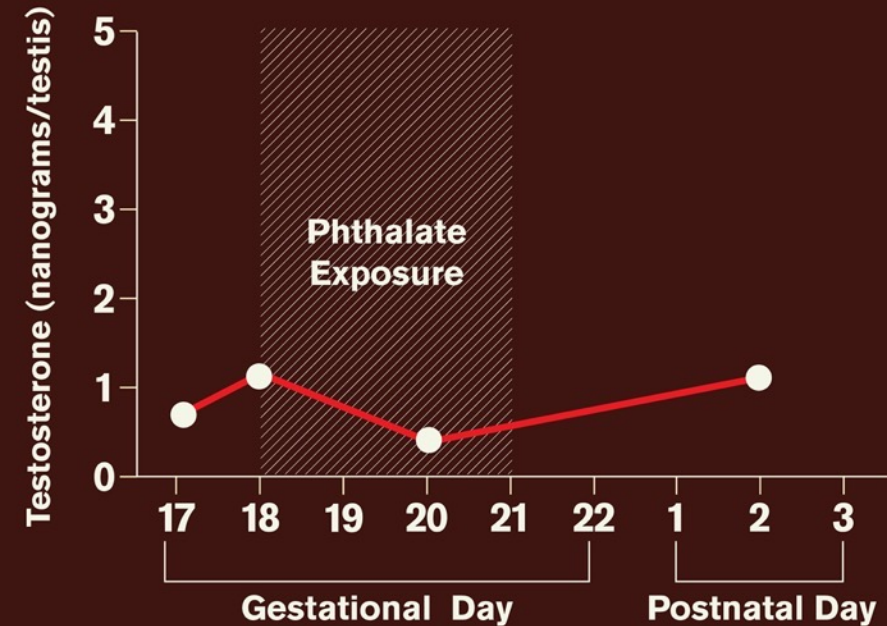
¹Department
Reproduct
Missouri-C
Division o
Research
of Minnes
⁹Departme

Prenatal Phthalate Exposure Lowers Fetal Testosterone

Unexposed mom



Mom with Phthalates



PARKS ET AL. 2000 TOXICOL. SCI



Prenatal exposure is more important than postnatal exposure



40%
Around the time of conception



40%
During pregnancy



20%
During adulthood

THE ROADMAP



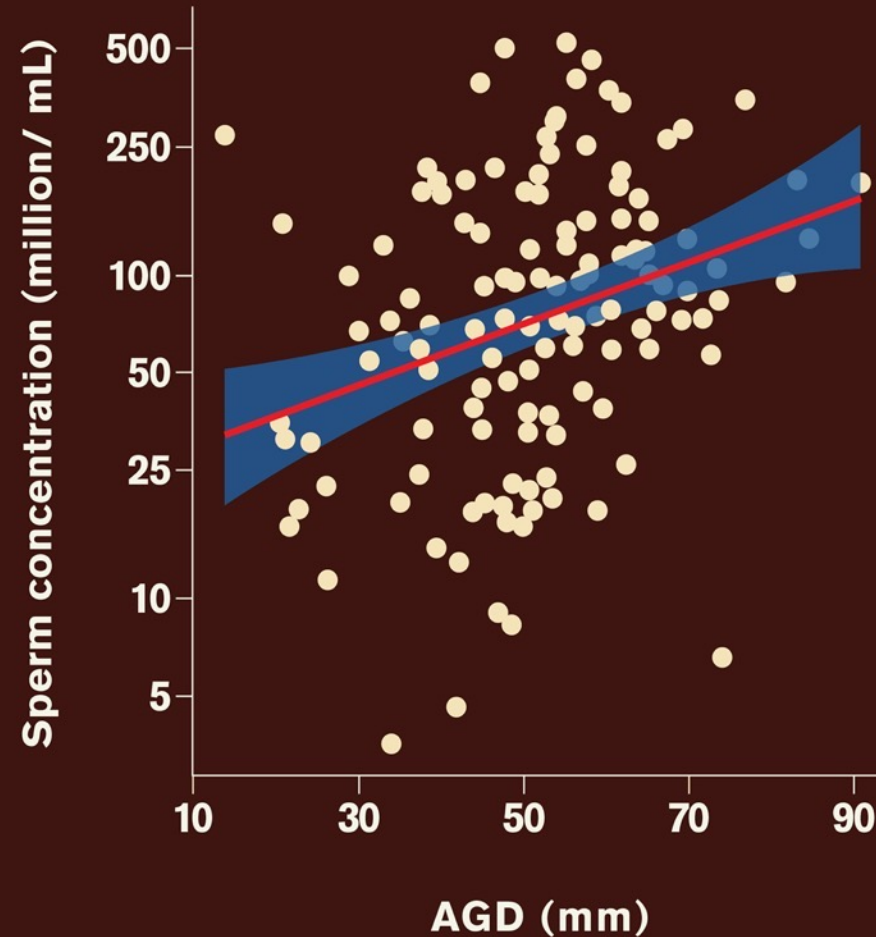
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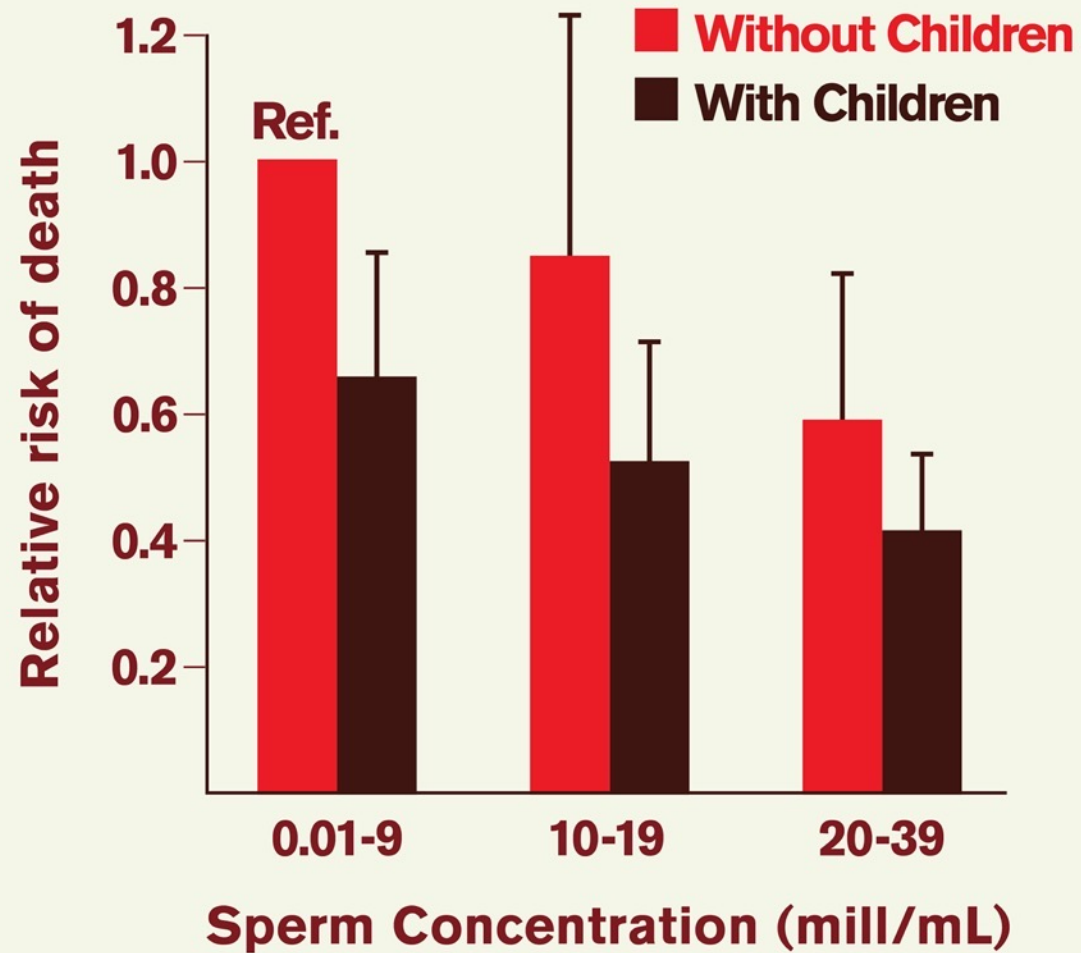
Its Solutions

Shorter AGD is associated with lower sperm count



MENDIOLA ET AL., 2011, ENVIRON HEALTH PERSPECT

Poor reproductive health has lifelong consequences



JENSEN ET AL, 2009



Exposure

Mother (F₁)

Fetus (F₂)

Reproductive cells (F₃)



**Health effects
reported in the F₂
generation that was
not directly exposed**

THE ROADMAP



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Remove



Chemicals that are:

- Hormonally active
- Cause harm at low doses
- Environmentally persistent
- Untested for toxicity

Replace



With chemicals:

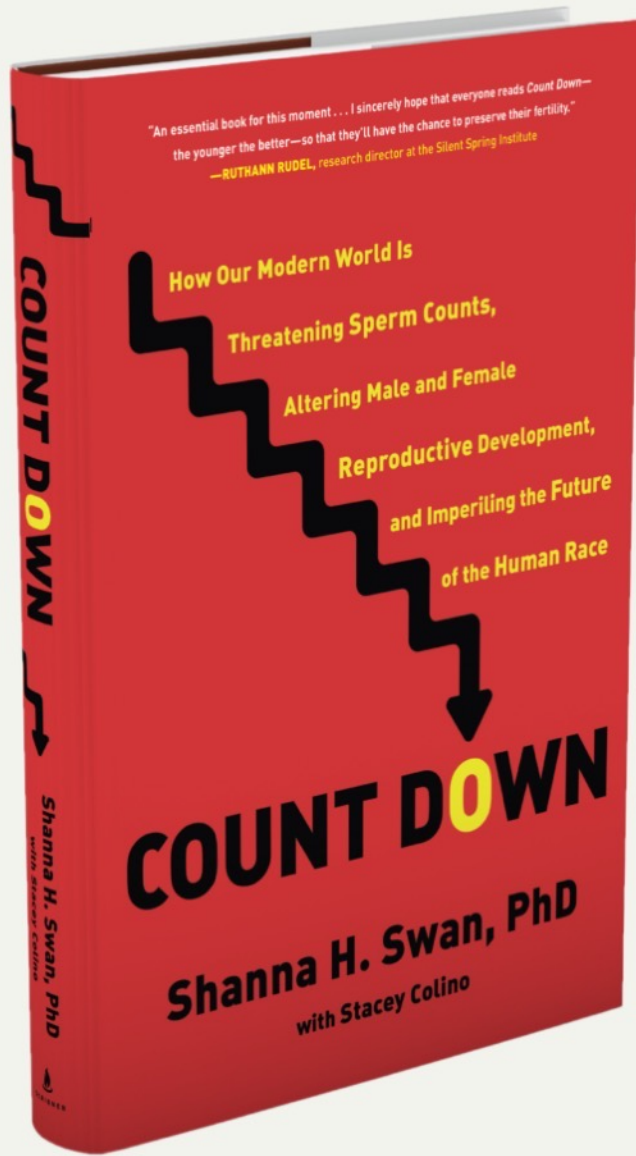
- Without endocrine disrupting effects
- Free of low dose adverse effects
- Minimally environmentally persistent
- Shown to be safe prior to marketing

Regulate



By assessing:

- Low dose effects
- Mixture effects
- Environmental persistence
- Risks in untested chemicals



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