Anogenital distance: Linking the fetal hormonal environment and reproductive function

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CHE Call

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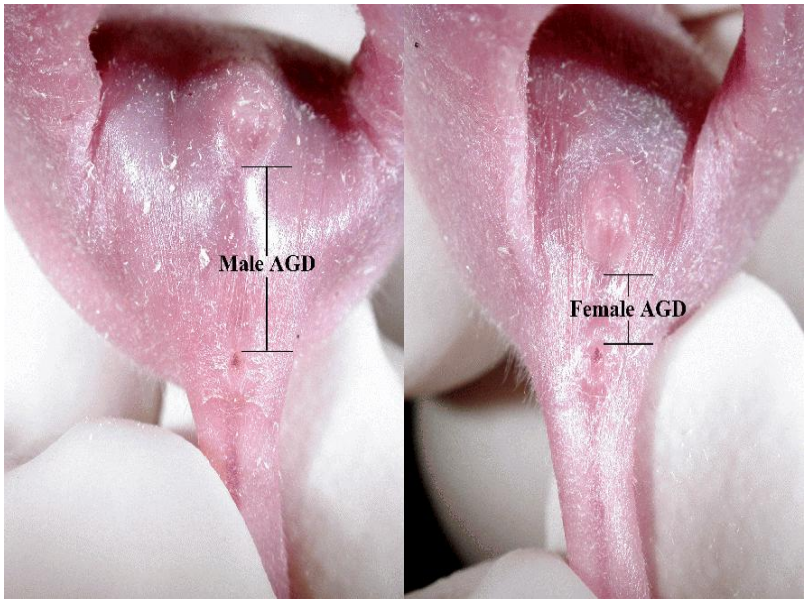
Anogenital distance (AGD)

- In rodents, twice as long in males as in females
- Prenatal anti-androgen exposure shortens male AGD
- Size of AGD reflects intrauterine position



AGD: Reflects fetal androgen exposure

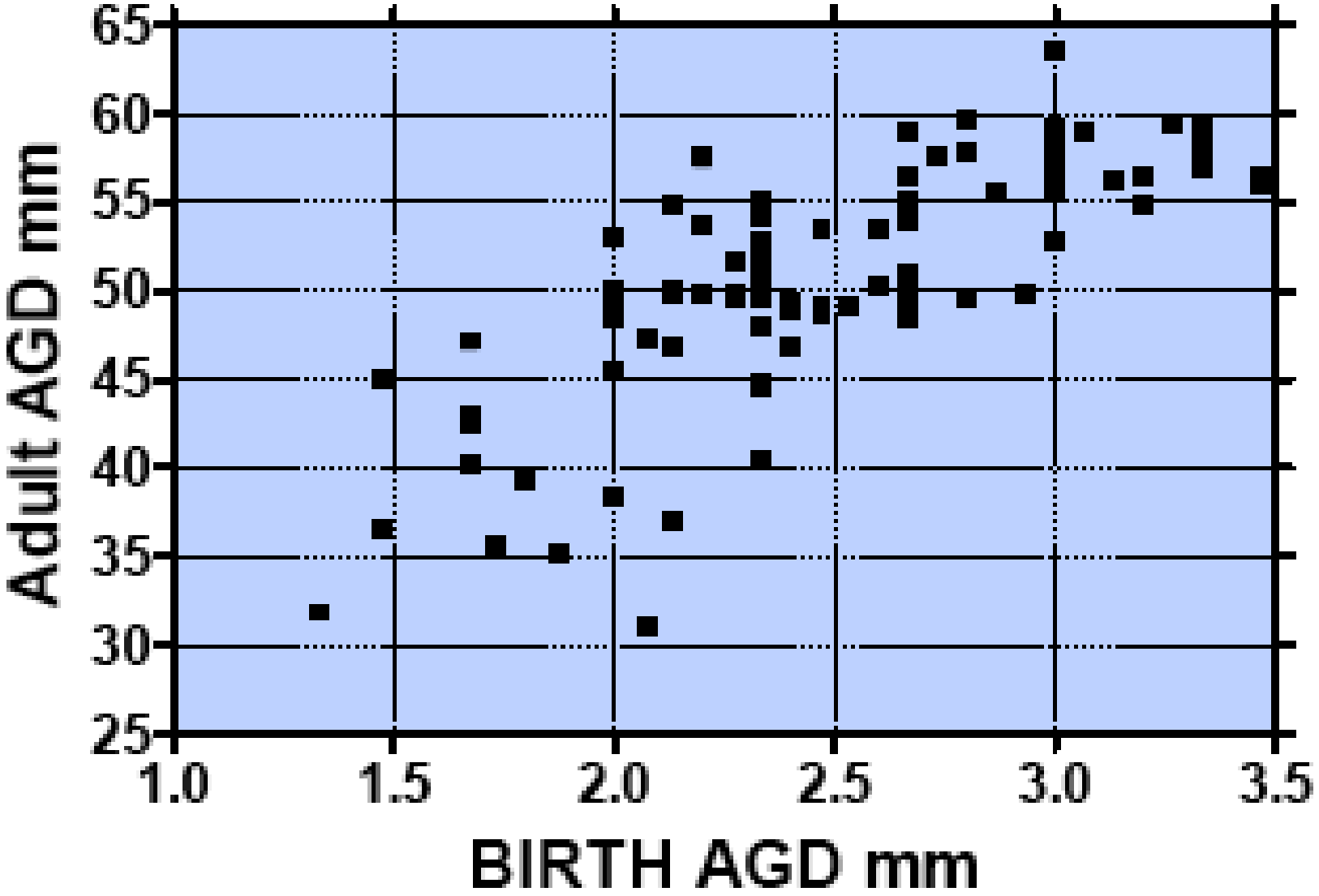
In early fetal life:

- Anti-androgens ***shorten male AGD***

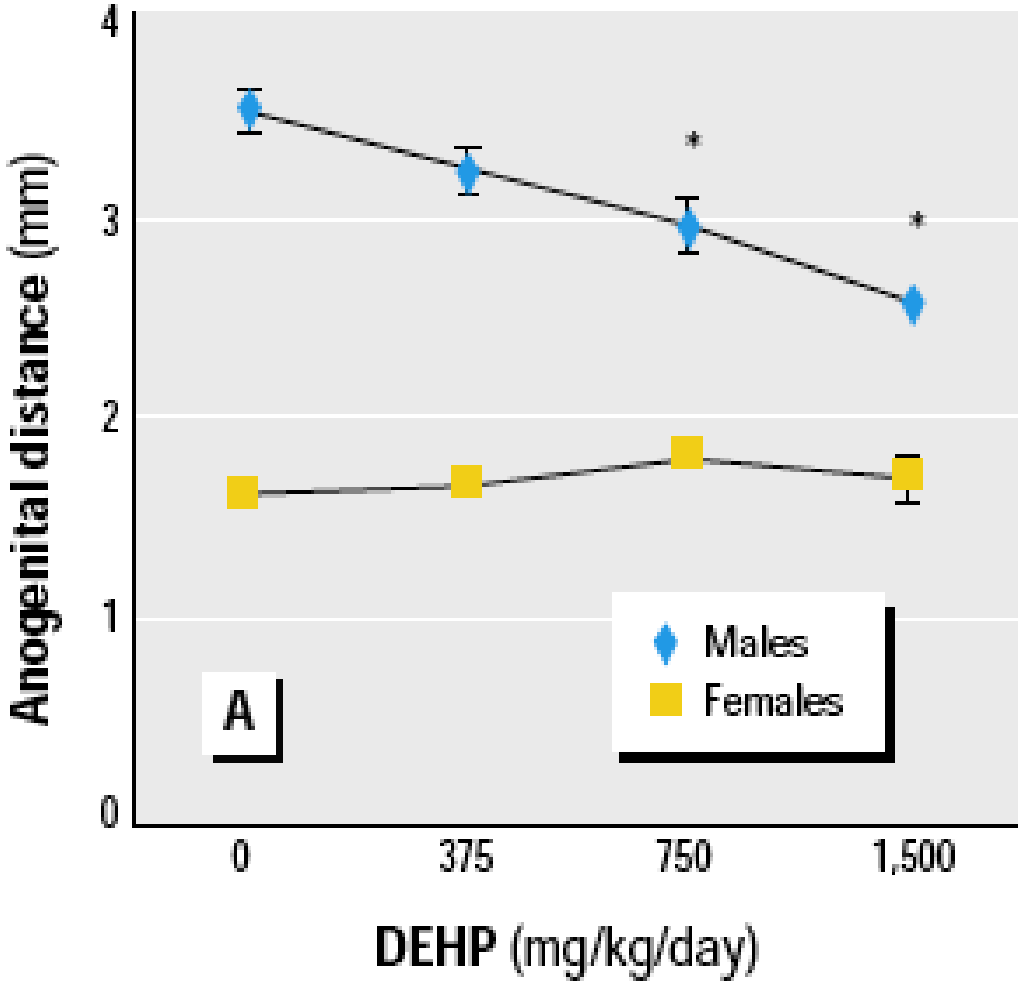
- Androgens ***lengthens female AGD***

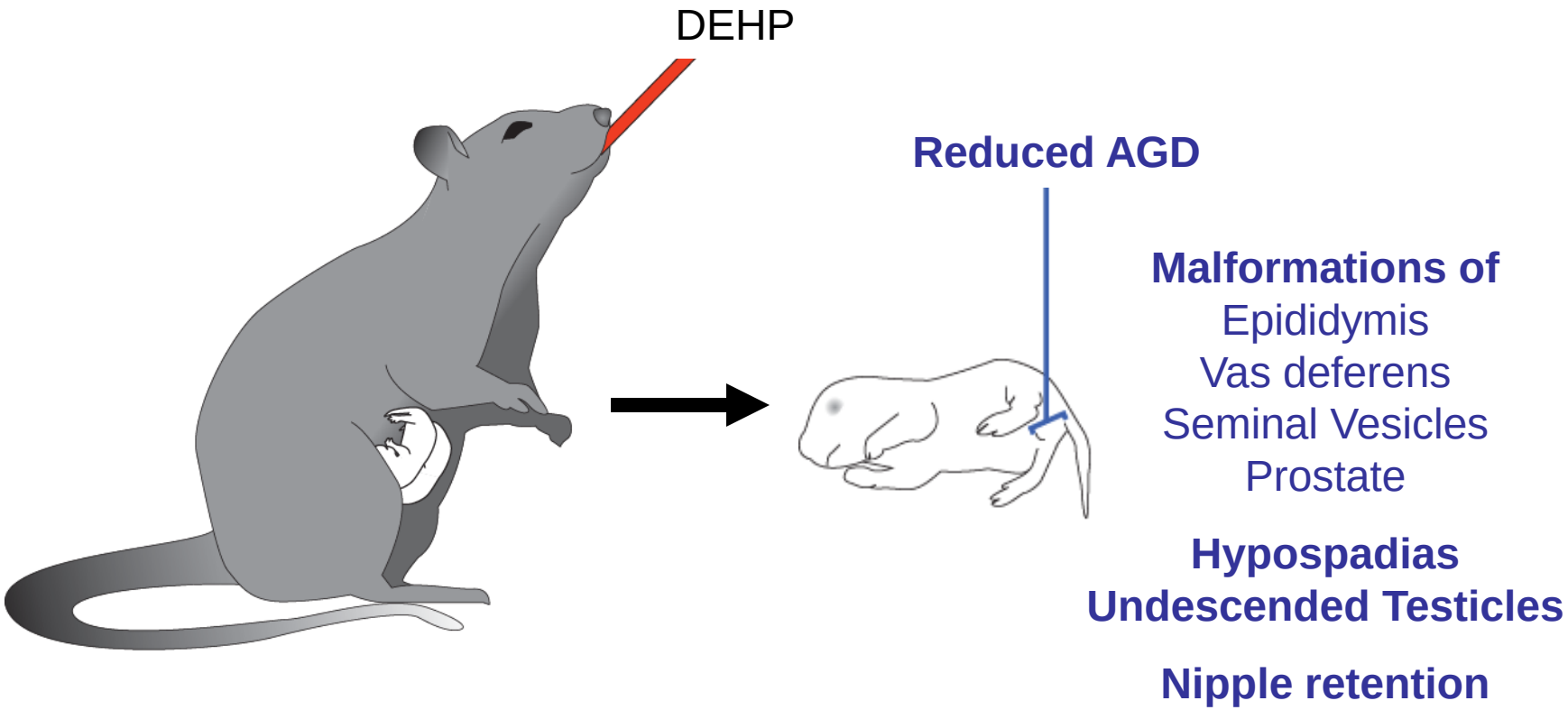
Seen in many mammalian species
We hypothesize also true in humans

Antiandrogen-treated rats with reduced AGD at birth have reduced AGD as adults. Hotchkiss et al. 2004



DEHP and AGD (Moore, 2001)

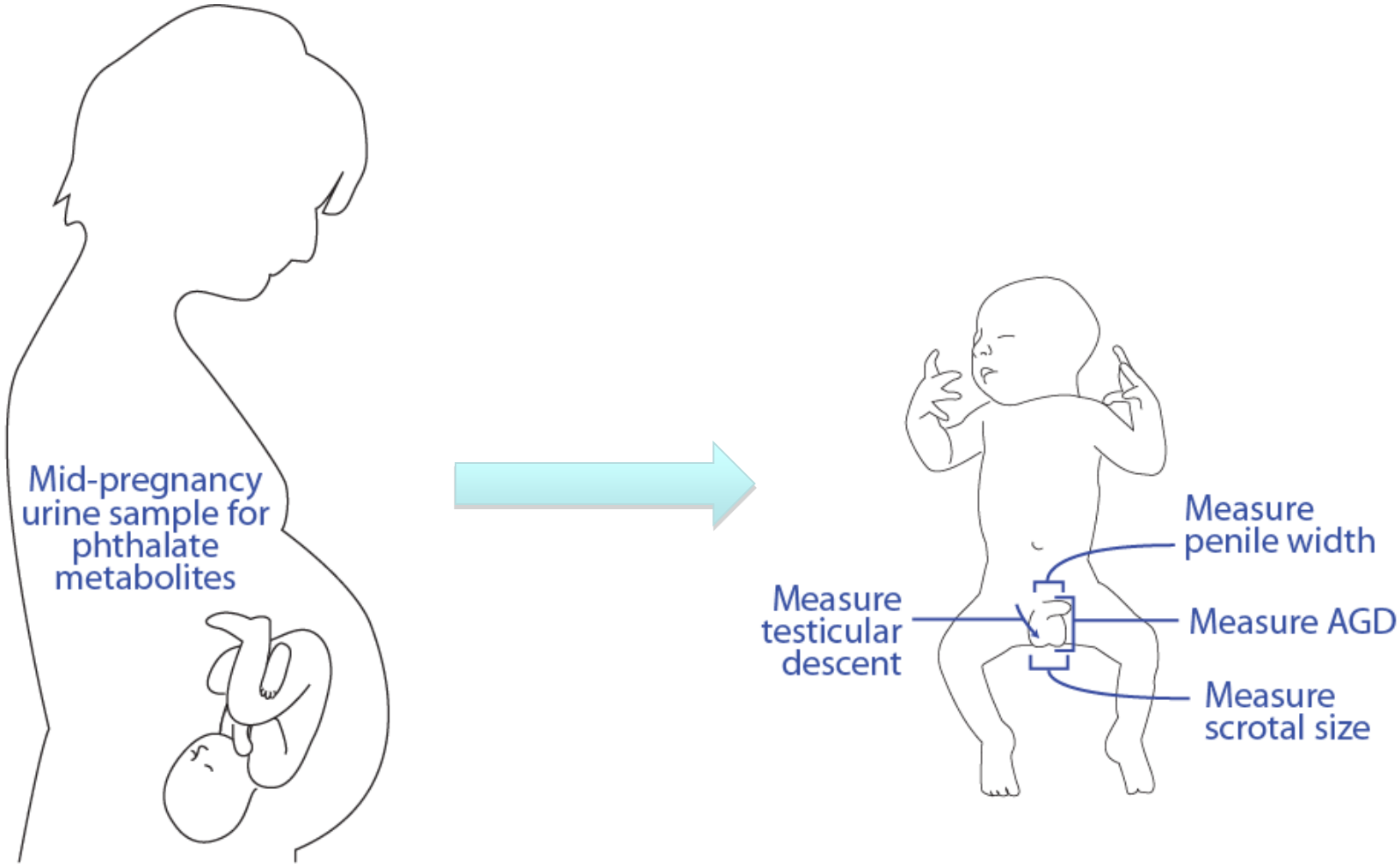




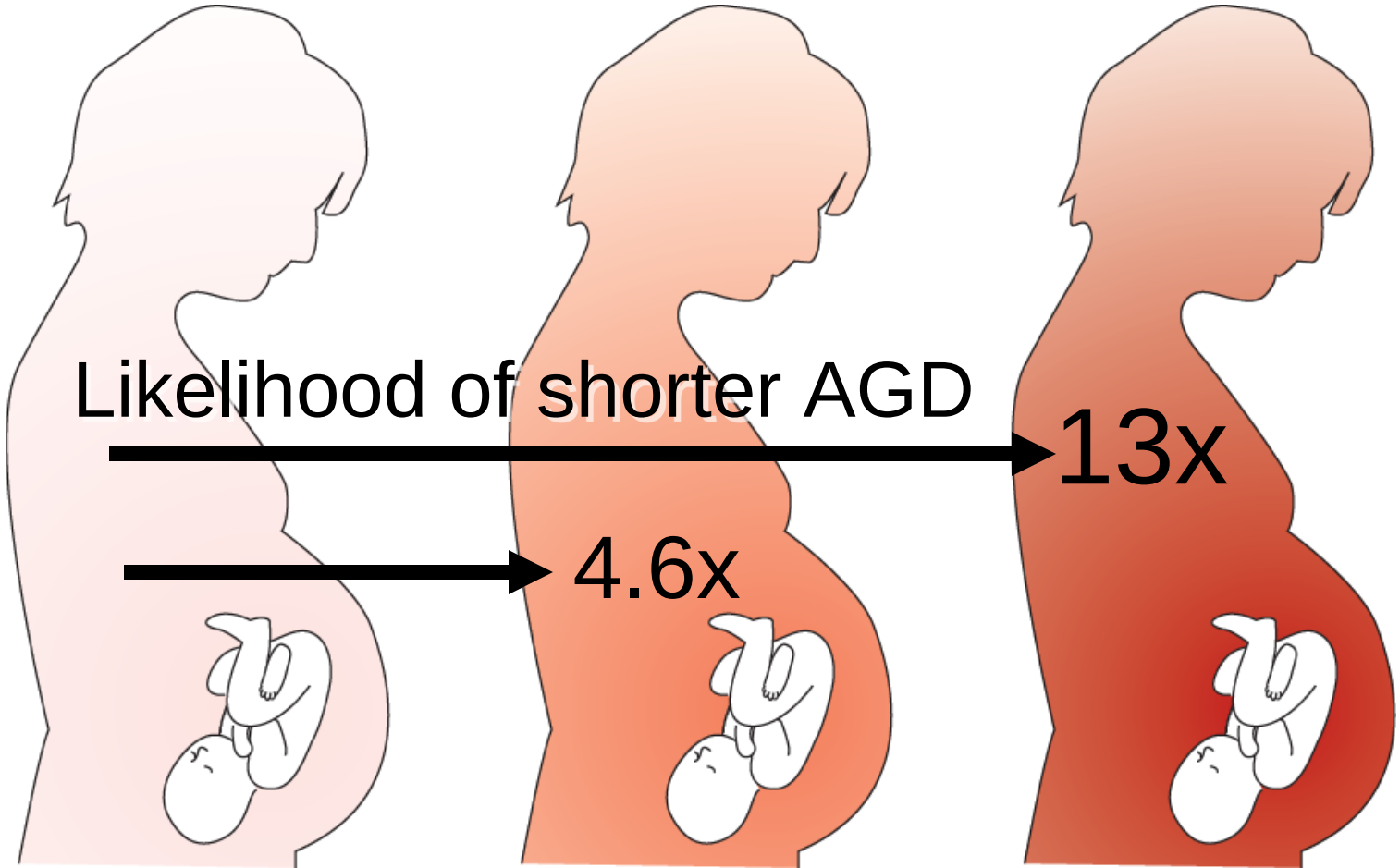
Together these comprise the “phthalate syndrome”

Gray and Foster 2003, Foster 2005

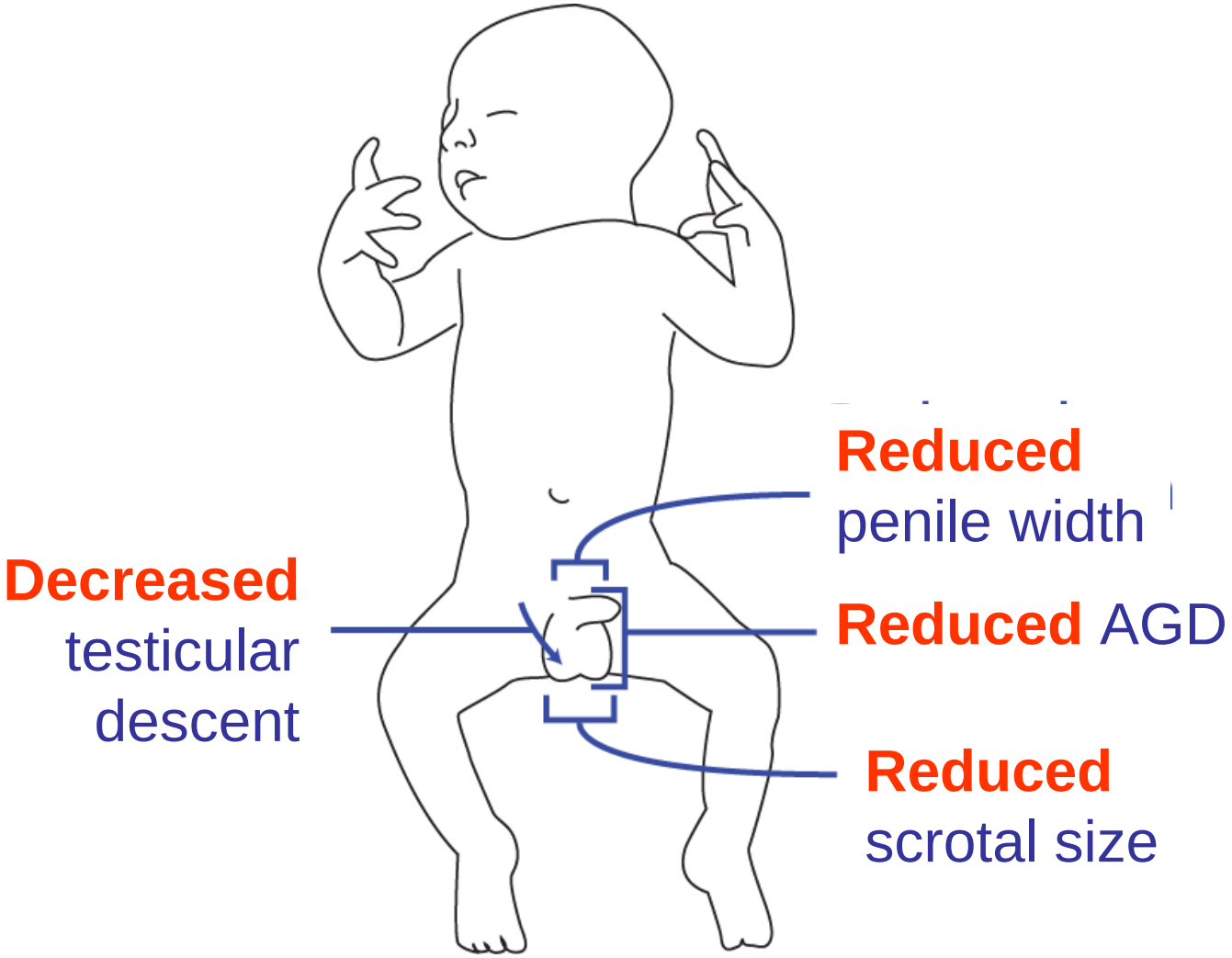
Measured in boys



	Percentile (ng/mL)		
Monoester Metabolite	**25th**	**50th**	**75th**
MEHHP	6.0	11.4	20.1



DEHP exposure was associated with multiple endpoints in boys but not girls



Prenatal exposure to many EDCs reduce male AGD in rodents

- Vinclozilin
- PCB 126
- DDT
- TCDD
- Genistein
- Azole fungicides
- Flutamide
- PBDE 99
- P,p DDE
- BPA
- DES
- Procymidone

Does short male AGD matter?

- Boys with genital defects (hypospadias and cryptorchidism) have shorter AGD (Hsieh et al, 2008)
- In rodents, short AGD predicts low sperm count and problems with fertility
- Is AGD related to semen parameters and fertility in humans?

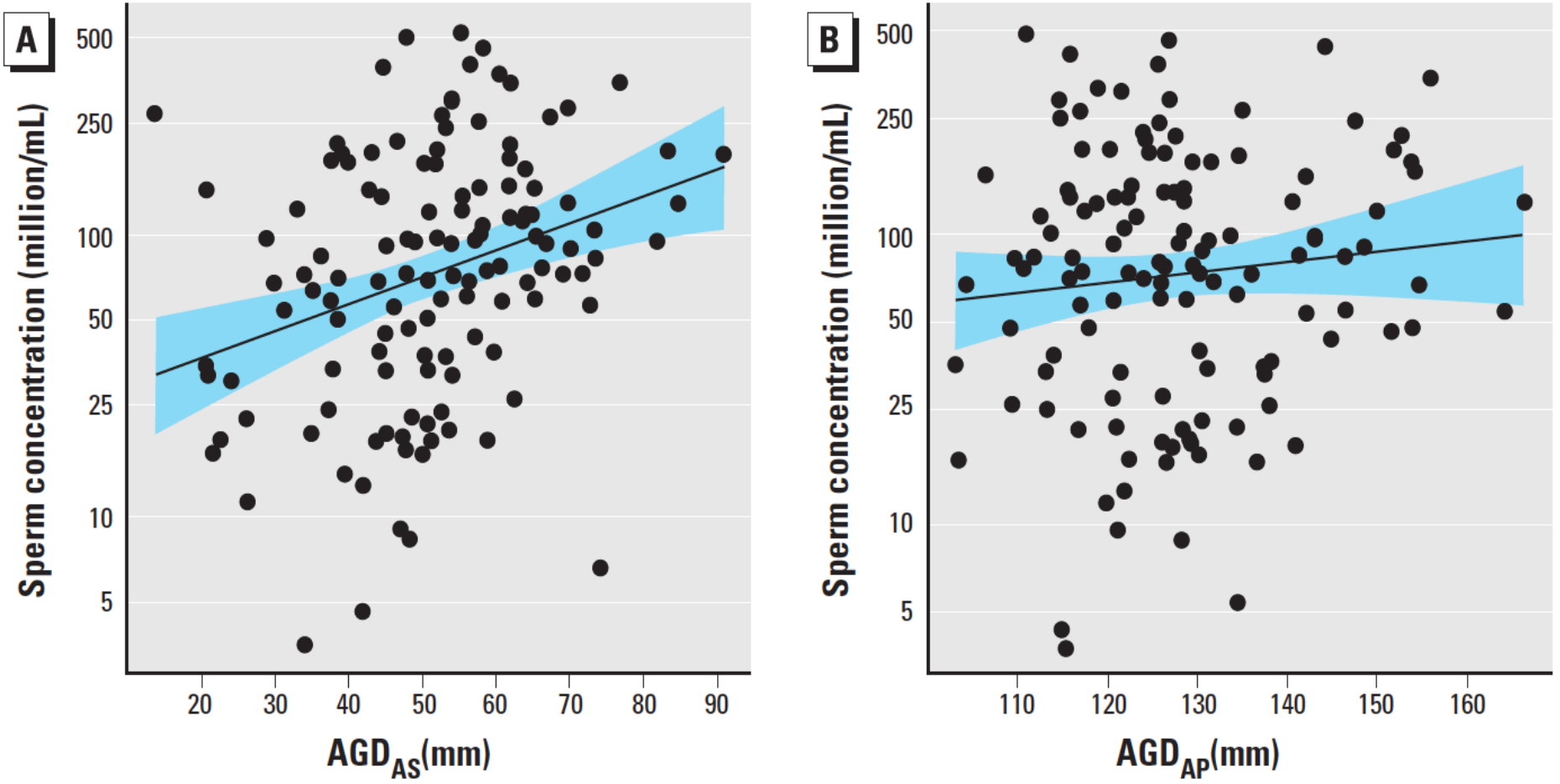


Figure 3. Partial regression plot (mean ± SE) of sperm concentration modeled as a function of (*A*) AGD_{AS} and (*B*) AGD_{AP}.

Mendiola et al., 2011, Environ Health Perspect.

AGD in Childless Men vs Fathers