



Combination effects of chemicals

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Chemical risk assessment practice



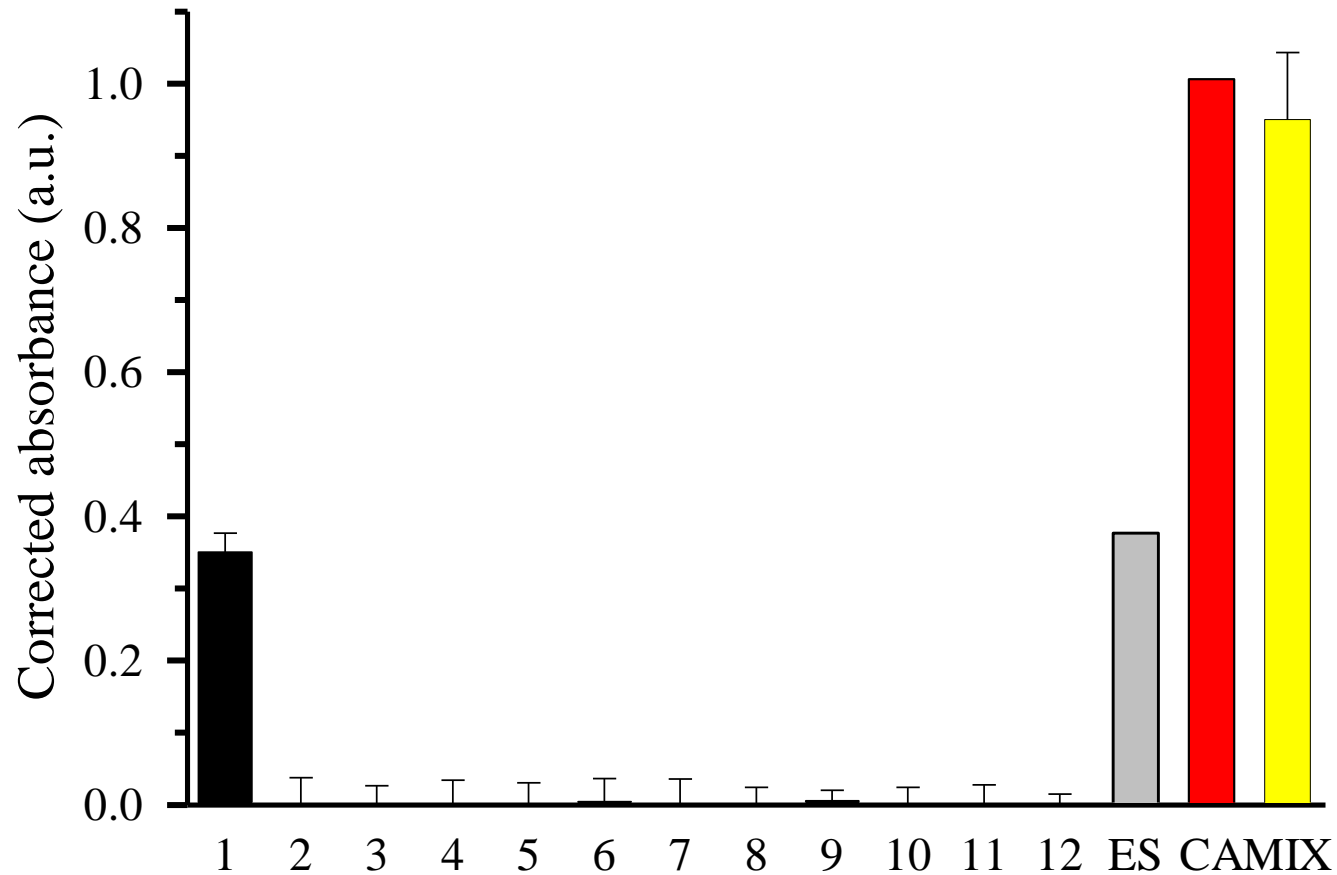
dreamstime.com

Slice-by-slice: often no risk



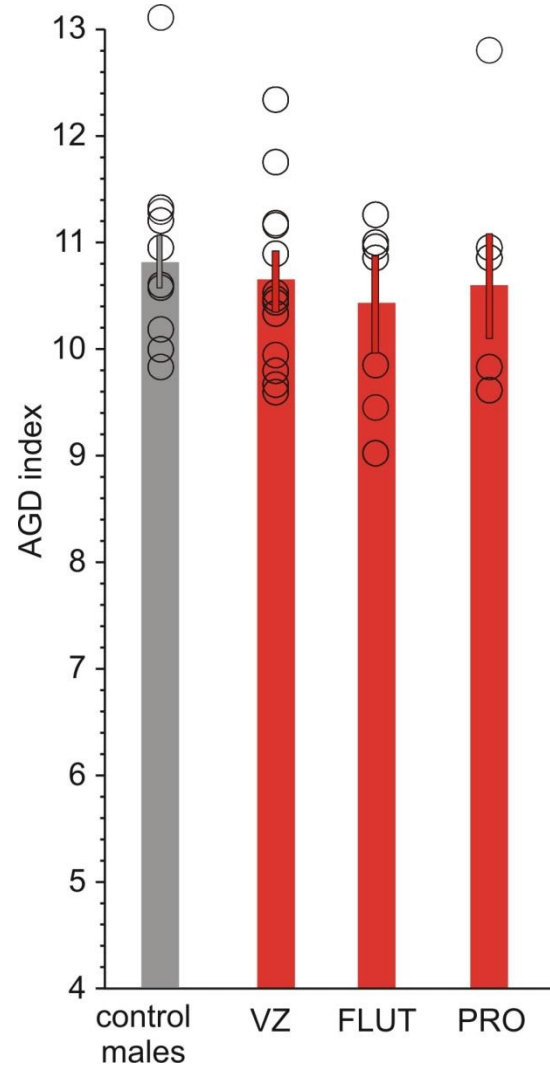
The whole sausage: risk?

Something from “nothing”



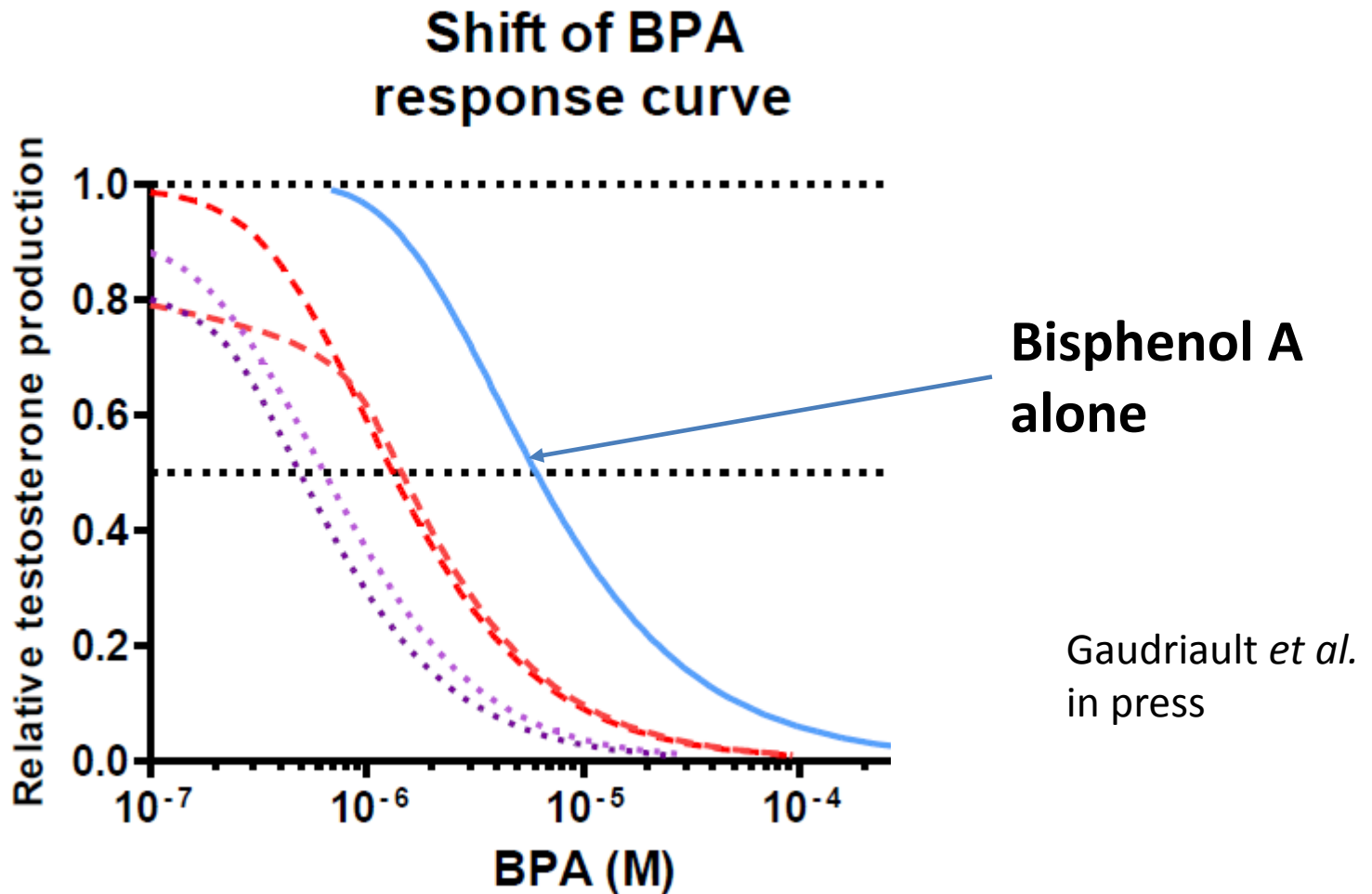
Rajapakse *et al.* (2002), EHP **110**, 917

Something from “nothing”



Hass *et al.* 2007,
EHP **115** (Suppl 1),
122

Testosterone production in human fetal testes



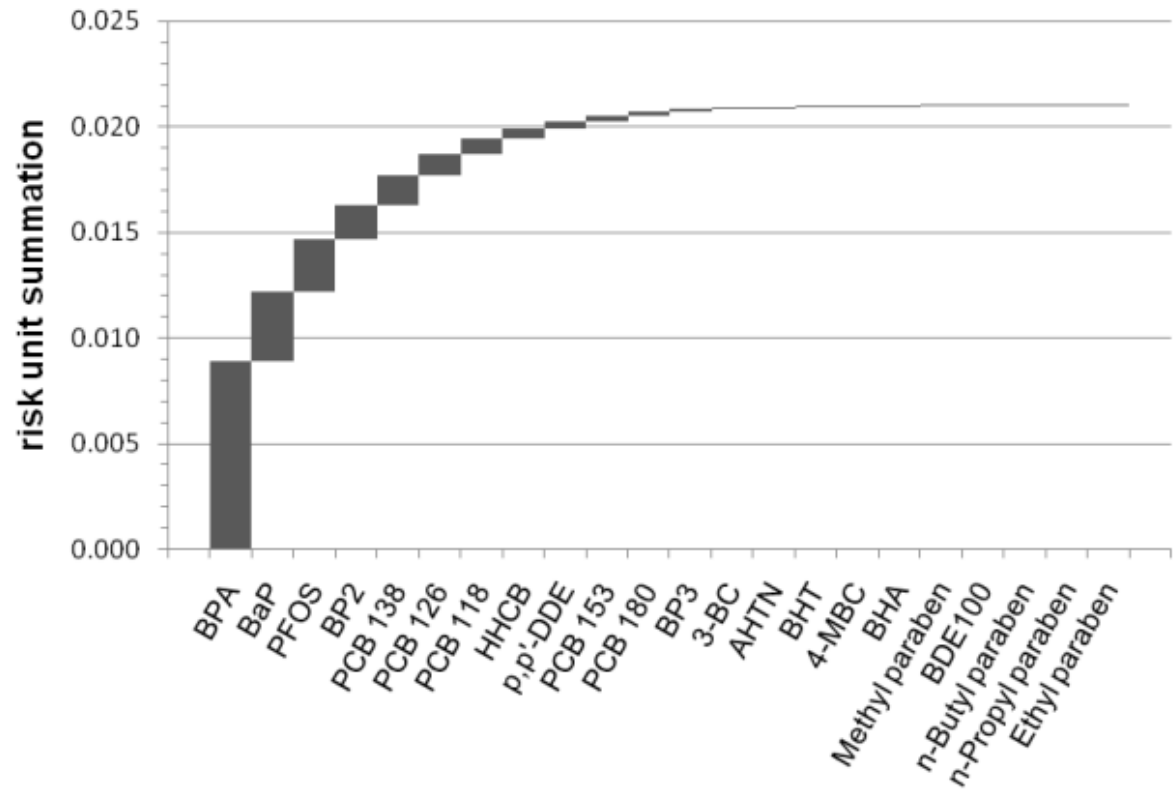
**Not all mixture components are
equal....**

*...some are more equal than
others*

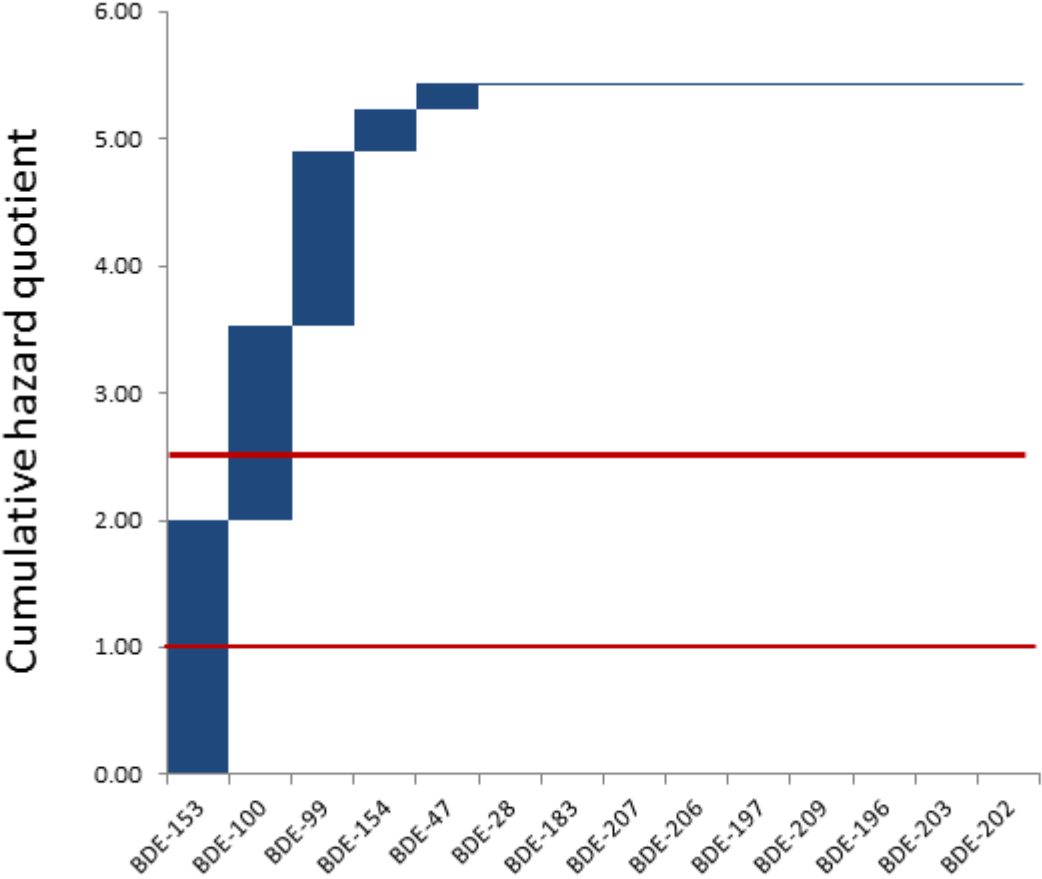
Antiandrogens

Kortenkamp *et al.* (2014),
Reproduction

“Real world”
mixture of AR
antagonists



Flame retardants in breastfed babies



Challenges for a “Non-toxic environment”

- Priority mixtures?
- Adjust “tolerable daily intakes” by taking mixture effects into account?
- Better, more comprehensive exposure assessment – what other chemicals contribute?

Thank you!

