Dietary exposure to pesticides:

Changes needed for consumer's safety

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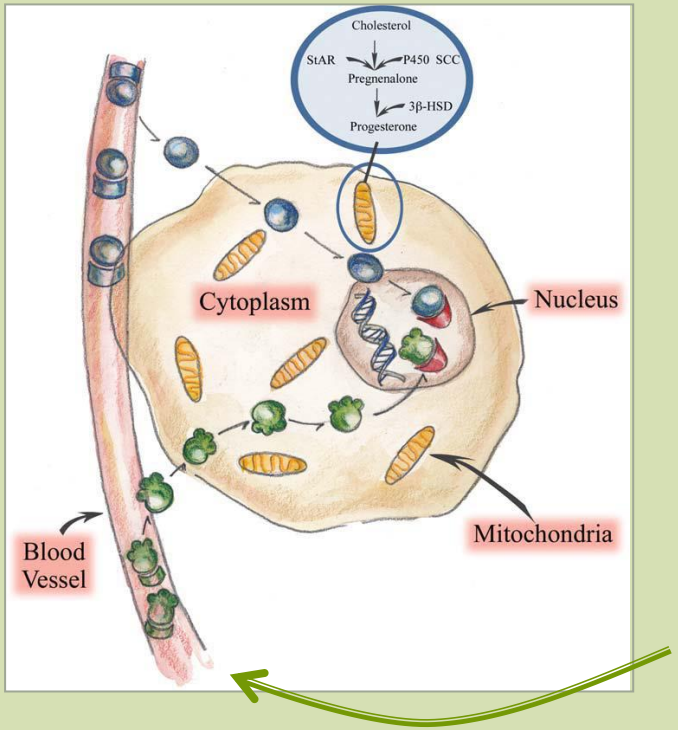
Environmental Toxicologist
EFSA- Revisiting the IESTI equations; Geneva, Sep 7th 2015

Pesticides

Deliberately made to be toxic to living organisms

- Cellular sites in target species similar to humans and other animals



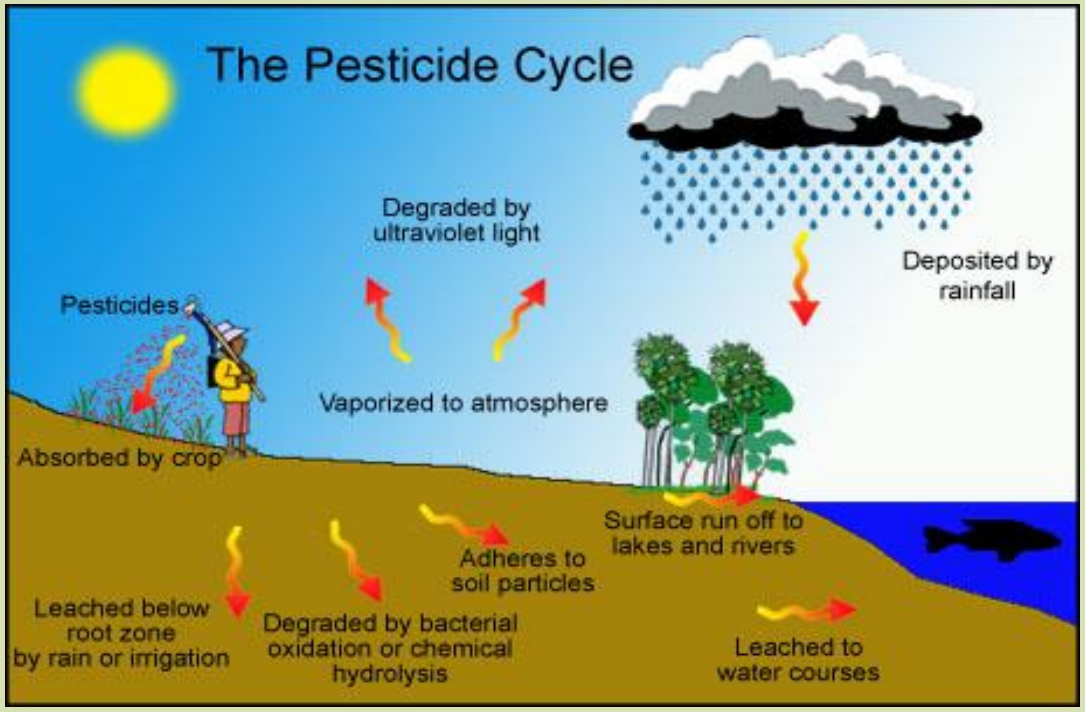
Pesticides are toxic to non-target species and humans

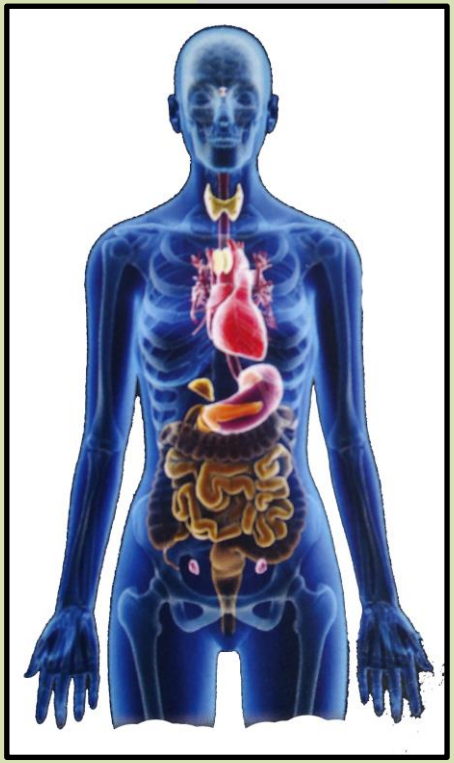
Low solubility → Contamination of ecosystems

Pesticides

Detected in: biota, soil, sediments, water systems, human tissues and blood, including newborns.

EU sales: 300,000,000 kg/year





Pesticides

Diet is not the only route of exposure

Air, water

Skin

Cosmetics
Detergents
Paints
Clothes
Plastics
Household objects

+ hundreds of environmental pollutants

Protection of human health

PPPR (EC) 1107/2009, Article 4 (3b):

"**it shall have no immediate or delayed harmful effect on human health**, including that of vulnerable groups, or animal health, directly or through drinking water (taking into account substances resulting from water treatment), food, feed or air, or consequences in the workplace or through other indirect effects, **taking into account known cumulative and synergistic effects** where the scientific methods accepted by the Authority to assess such effects are available; or on groundwater"

Concerns

- Correlation of pesticides in urine with high vegetable and fruit consumption (IVL, 2015).

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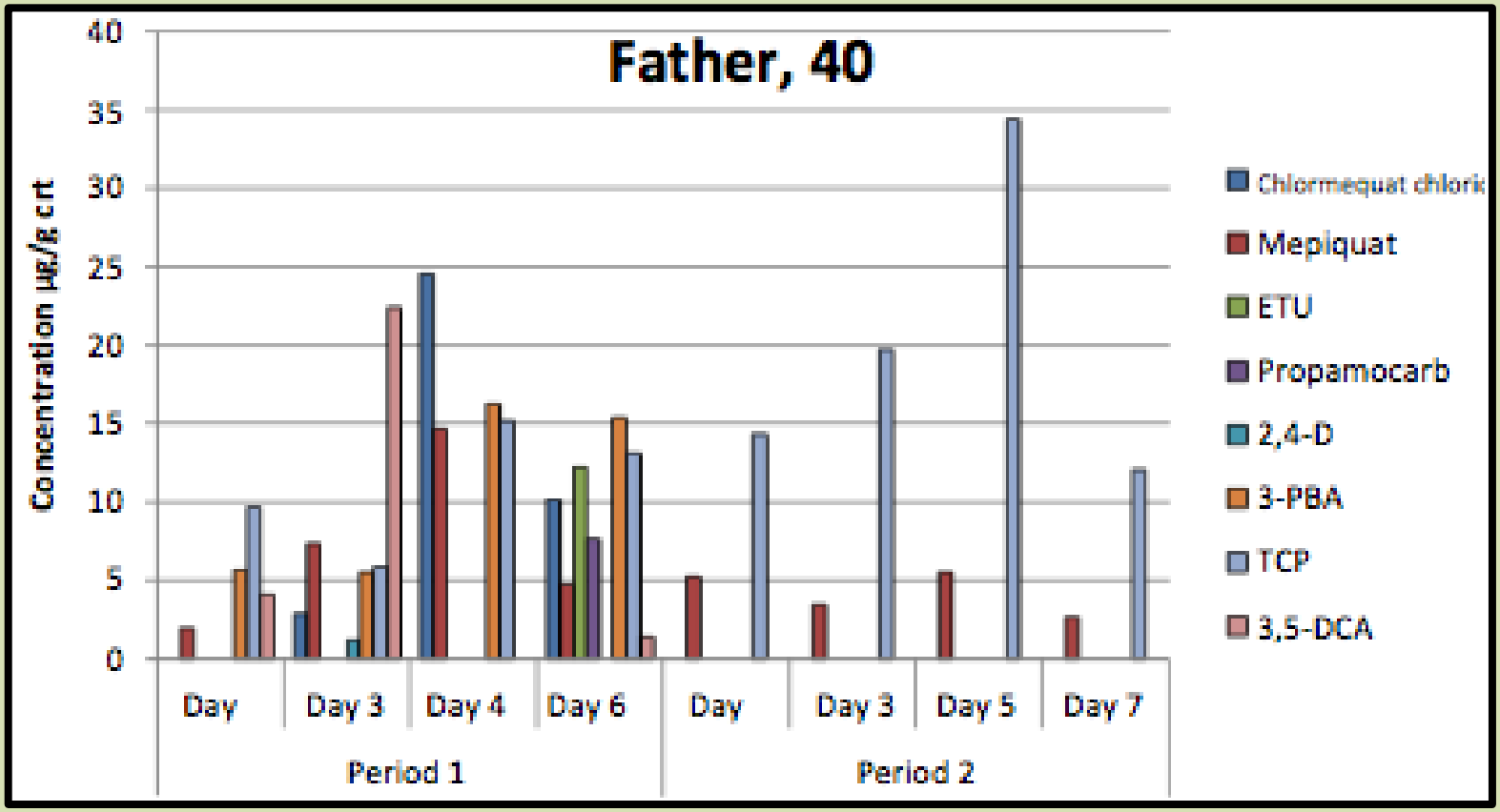

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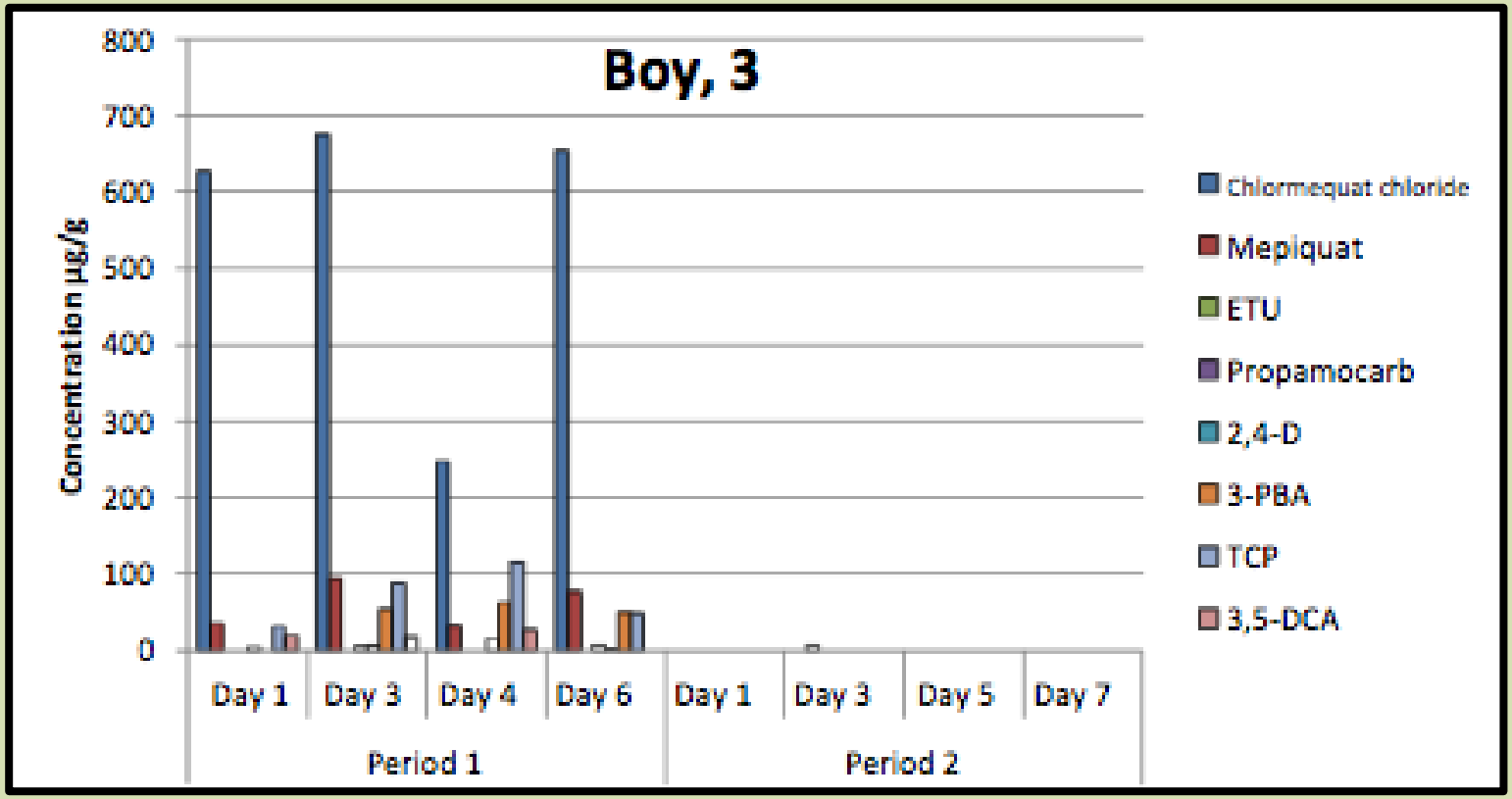

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- Some pesticides are endocrine disruptors, they act at very low, environmental levels –

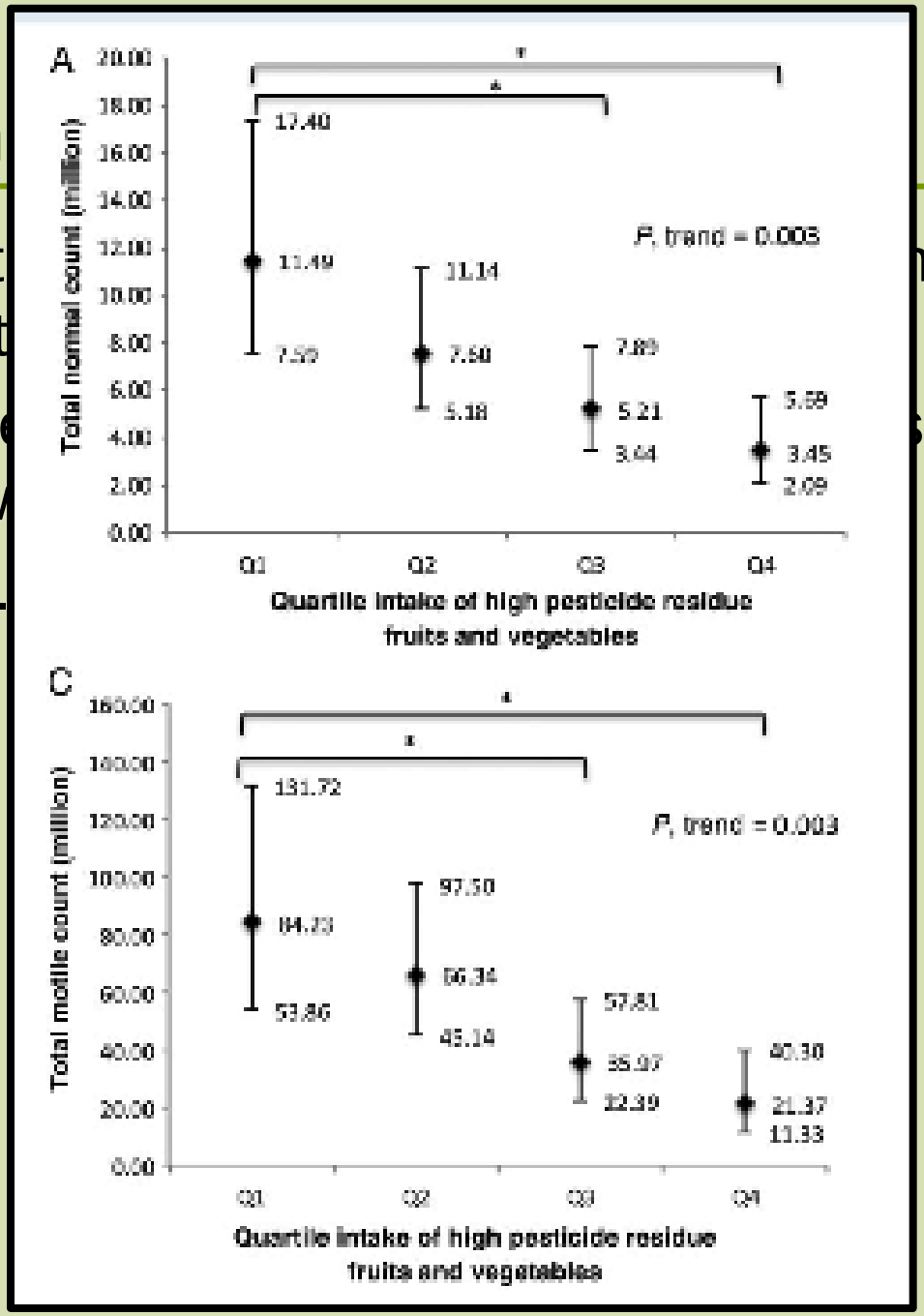
  e.g. pesticide exposure and sperm quality

  (Chiu et al., 2015)

Concern

- Correlat … vegetable and fruit …
- Some pe … , they act at very low …

e. … quality



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  - Very low concentrations are not tested in RA
  - Vulnerable population: unborn, pregnant women, babies
  - Diseases manifest later in life
  - Cumulative effects
- RA must adapt to the latest scientific findings
  - New test methods and endpoints

Assessment of human dietary toxicity

Laboratory breed

(less responsive?)

Dietary exposure to a single chemical

Highly unrealistic!

Guidance Values

- Safety/Uncertainty factors → x100 Non- conservative
- NOAEL/BMD
- ADI
- TDI
- ARfD

→ Single compound exposure

→ IESTI → MRL ✓

- Commodities > 1 pesticide → Strawberries, apples pears may contain up to 15 pesticides….
- Other pollutants?
- Sensitive groups? Elders, unborn, people with sickness? → Delayed endocrine related diseases?

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Over conservative?!

Great uncertainties!

Cumulative Risk Assessment

EFSA Opinion 2013 → Cumulative Assessment Groups

- Based on shared toxicological profiles and common adverse effects
- Effects on individual organs and organ systems (e.g. thyroid and nervous system)
- Powerful tool for establishment of new MRL
- Vital priority in RA

IESTI

Higher level of protection by:

- HR replaced by MRL in IESTI equations (paragraph 2.1)
  - Prevent IESTI ≥ ARfD
  - Prevent MRLs that allow ARfD levels in food
- Variability factor (paragraph 2.2)
  - V=7 in all commodities, in trials exceeded only in 1% (EFSA, 2005)
- Conversion factors (paragraph 2.3)
  - IESTI ➔ dietary intake (surrogate-MRL)
  - Real monitoring data are needed

IESTI

Higher level of protection by:

- Harmonised LP? (paragraph 2.4)
  - National LPs, when necessary use the highest portion consumed/most critical (i.e. EU)
  - Separate LPs for raw/processed commodities

IESTI

Higher level of protection by:

- LoP 100% not 90% or 99% (Chapter 3)
  - IESTI<ARfD ➔ HR or STMR=MRL and V=7
  - LoP>99.99% ➔ Conservative? ✓Good
- MRLs based on commodity as market product

- Food inspection (chapter 4)
  - LP according to market target population
  - HR can be replaced by the actual residue levels
  - Harmonisation only if highest value is used
  - EFSA responsible for EU

Threats

- Assuming that IESTI is over-conservative
- Global extrapolation ➔ undermine regional habits
- Extrapolation at population level ➔ undermine the weak, vulnerable
- Regional monitoring is essential
- Not adopting the “worst case scenario”
- IESTI not based on cumulative risk assessment

Final remarks

- Priority in the EU is to protect human and environmental health
- IESTI being over conservative is a myth
- EU must adapt to a CRA of pesticides
- IESTI must be modified according to CRA
- EU must move towards a low-pesticide and sustainable agriculture, and towards a toxic-free future

Thank you!