

# Health effects of organic food – what can we say

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# Implications

- Debate of the health effects of organic food is quite fervent from time to time
- Not enough scientific studies yet to give fair objective statements
- Part of consumers are content with the knowledge of following the regulations for organic cultivation
- Part of consumers would like to have clear proof of health effects
- Part of marketing people give too high promises...

# Background and objectives

- Meta-analyses of nutrient contents, heavy metal contents and pesticide residue finding favour organic
  - Plant food
  - Milk
  - Meat (not enough evidence for conclusions)
- The small difference between nutrients may be clinically negligible

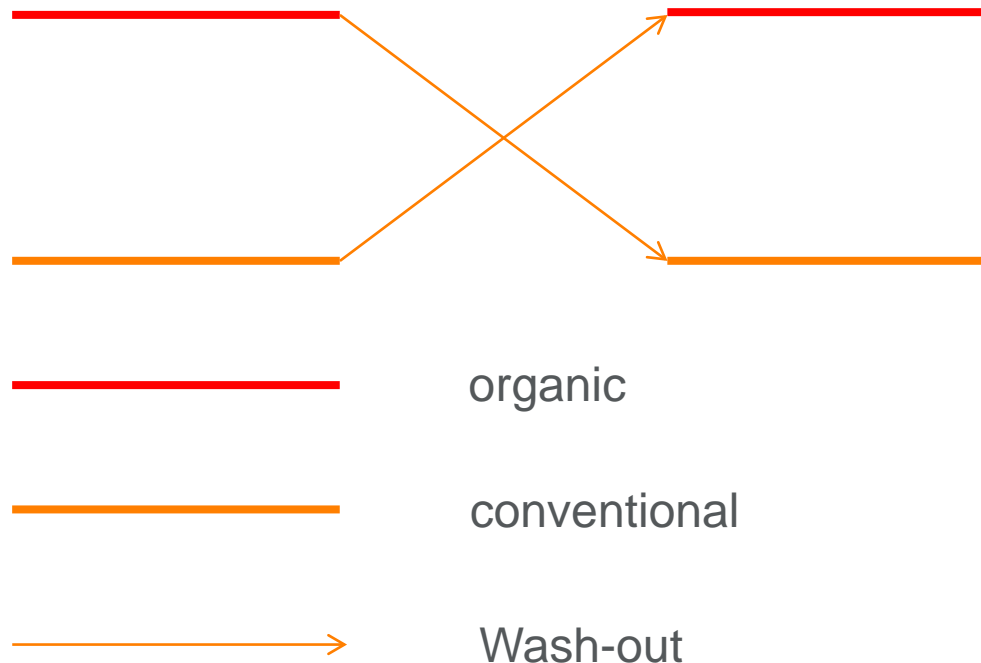
# Background and objectives

- All pesticides and food additives allowed in conventional production are tested for safety and re-evaluated regularly
- Intake of pesticides is on safe level (at least in Finland)
  - Small children tend to get high levels...
- Organic food contains less cadmium
  - The tendency is reducing both in organic and conventional production (emissions)
- Both organic and conventional products may contain environmental toxins.

# Background and objectives

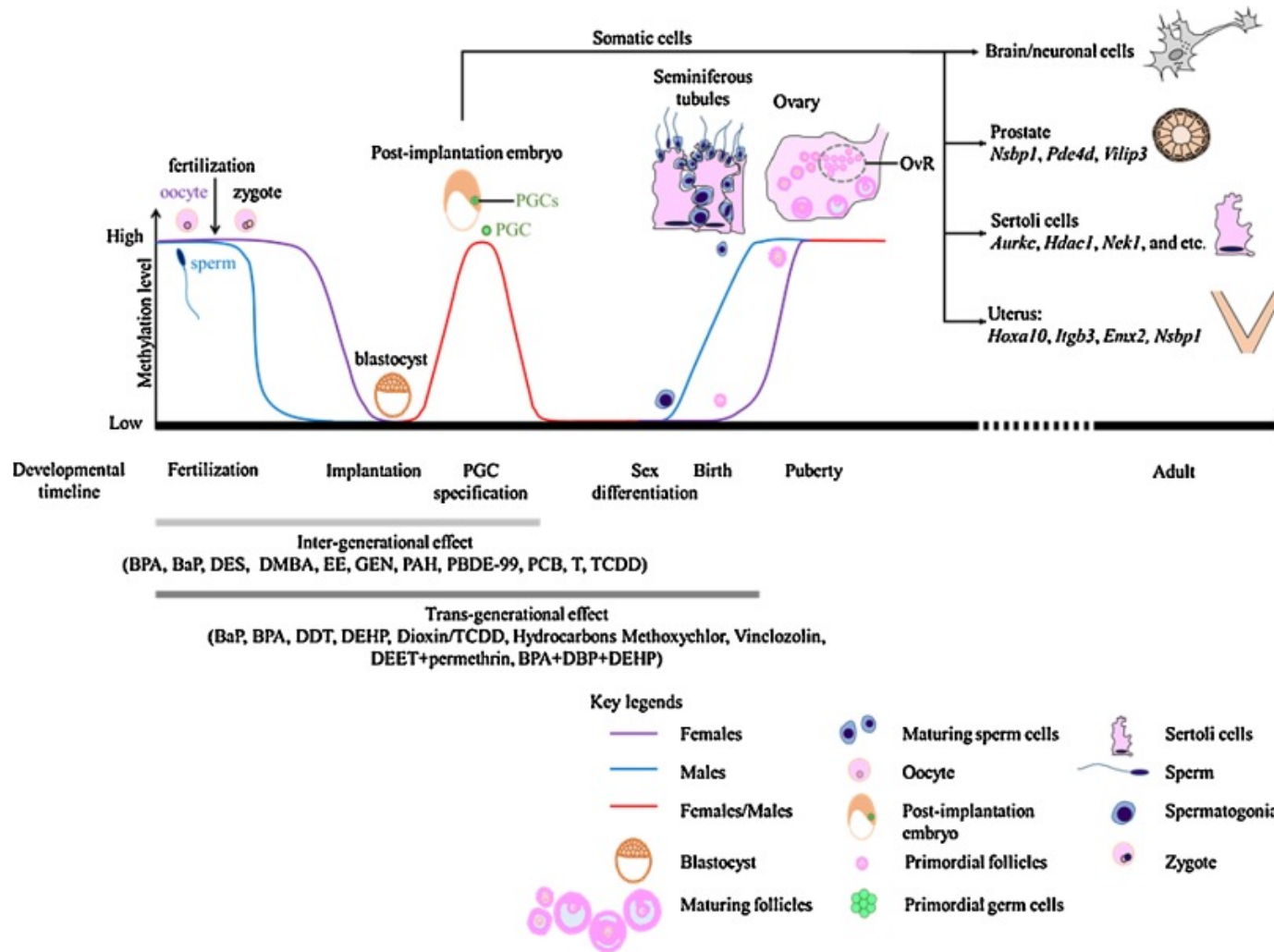
- How to compare organic and conventional?
- Double blind randomized clinical study is not appropriate, because many of the health effects seem to be due to epigenetic programming and effects of early life may be identifiable only in adulthood or during old age
- There are plenty of confounding factors
  - Exercise
  - Smoking, alcohol intake
  - Parents' and grandparents diet and lifestyle...

# Cross-over study



Run-in periods may also be important

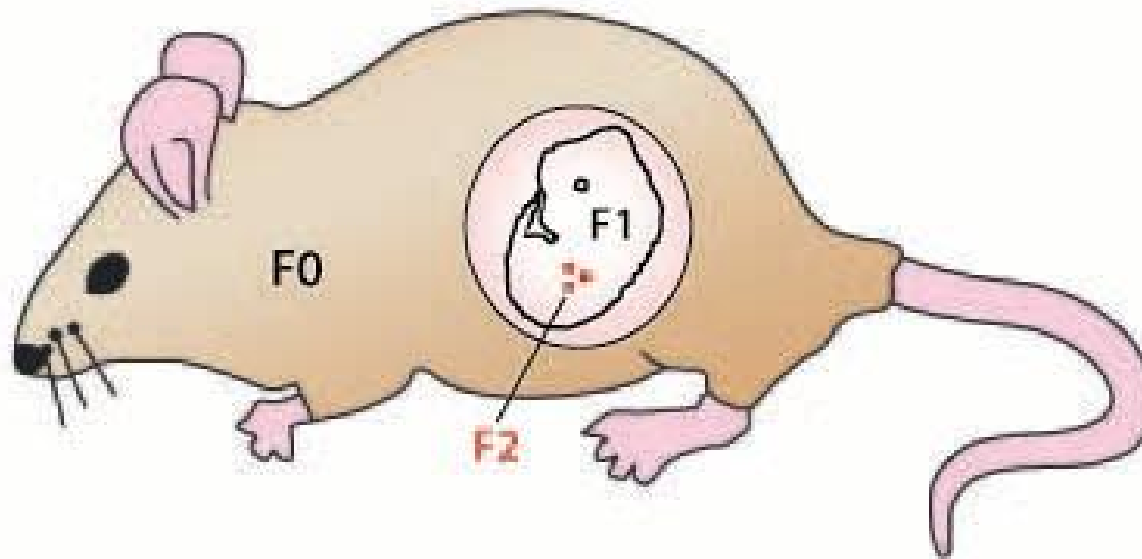
# Epigenetic programming



Shuk-Mei Ho, Reproductive Toxicology, Volume 68, 2017, 85–104 <http://dx.doi.org/10.1016/j.reprotox.2016.07.011>



# Epigenetic programming - transgenerational



**AR**

Youngson NA, Whitelaw E. 2008.

Annu. Rev. Genomics Hum. Genet. 9:233–57

## Background and objectives

- to do a literature search of clinical studies comparing health effects of organic and conventional diets and recent reviews of pesticide toxicology to find gaps in research

# Results and discussion

## Two reviews of health effects

- the scientific evidence from human studies is insufficient to conclude whether organic foods are more beneficial for health in some respects than are conventional foods (Brantsæter et al. 2016)
- No long-term cohort studies focusing on chronic diseases (CVD, diabetes, cancer, neurodegenerative conditions and no controlled human intervention studies (Baranski et al. 2017)

# Results and discussion

Concern of areas that should be investigated thoroughly

- Safety of pesticide is tested one by one, but pesticide mixtures can interact (Rizzati et al. 2016)
- Cumulative exposure during embryonal and fetal stage (Mitro et al. 2015, Strazzullo and Matarazzo 2016)
  - EDC and metabolic diseases in children (Russ and Howard 2016)
  - DDT metabolites, breast cancer (Cohn et al. 2015) and obesity (Skinner et al. 2013)

## Results and discussion

- Some pesticides and food additives affect both animal and human microbiota either indirectly or directly (Jin et al. 2017)
- Polymorphism in several genes may increase sensitivity to pesticides.
  - ApoE (Richardson et al. 2014)
  - PON-1 (Marsillach et al. 2016, Nam et al. 2016)
  - CYP2B6 (Lind et al. 2017) on pesticide levels in clinical

## Results and discussion

- Impacts of pesticides on human thyroid function?
  - exposure during critical windows of brain development (Campos and Freire 2016).
- Maternal or paternal exposure to pesticides / autism and ADHD (Mostafalou and Abdollahi 2017).
- A recent large prospective study found a negative association between high frequency of organic food consumption and risk of overweight and obesity (Kesse-Guyot et al. 2017)

# Results and discussion

- The methods used in safety evaluations at present are not up-to-date and do not take into account the chemicals combined in commercial products (Vandenberg et al. 2017)

# Conclusions

- Not enough clinical evidence to prove that organic diet is or is not better for health
- Contents of some beneficial and harmful compounds favor, but clinical impact ?
- Some concerns
  - ”chemical cocktails”
  - transgenerational effects
  - sensitive groups (polymorphisms in several genes)
  - indirect effects (microbiota)
  - methods used in safety tests



# Authors and institutions

- Raija Tahvonen, Natural Research Institute Finland (Luke)
- Results based mostly on the project long-term effects of changes in agriculture and food processing (funding application Kurppa S, Katajajuuri J-M, Tahvonen R)

Thank you!



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