

# Environmental pollution and human fertility



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FINAL DEGREE PROJECT

Degree in environmental biology

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## INTRODUCTION

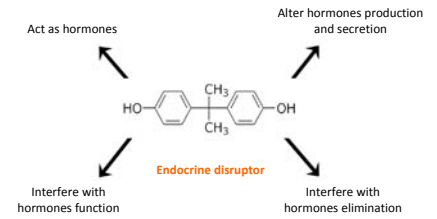
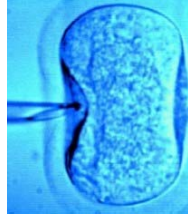
In Europe, the concentration of **environmental pollutants** has slowly increased over the centuries until the end of 1980. It has been observed that **reproductive, endocrine and development effects** are the most sensitive to exposure to environmental pollutants (Kogevinas M., 2001).

Several studies suggest that pollution is associated with

decreased fertility, decreased quality of gametes, sperm DNA fragmentation, altered menstrual cycle and inhibition of ovulation among others (Torf G. et al. 2004).

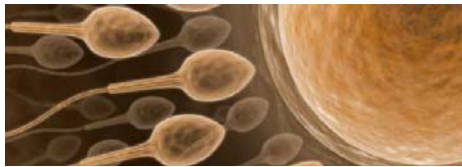
Environmental contaminants can cause **direct toxic effects** or **endocrine disruption**.

**Endocrine disruptors** are exogenous chemicals capable of altering the normal hormonal environment and reproduction. They alter the synthesis, metabolism and gene expression of hormones, creating critical situations for the development of the body (Guzman C. et al., 2007).



## HYPOTHESIS

Environmental pollution has a **negative effect** on human fertility.



## OBJECTIVES

Which pollutants cause negative effects on human fertility

How do they act on the organism and how do they affect reproductive health, depending on whether they are:

Toxic for fertility

Toxic for embryonic development

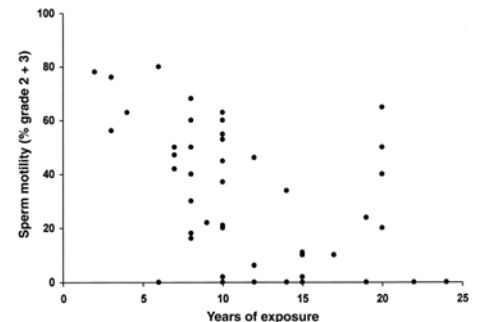
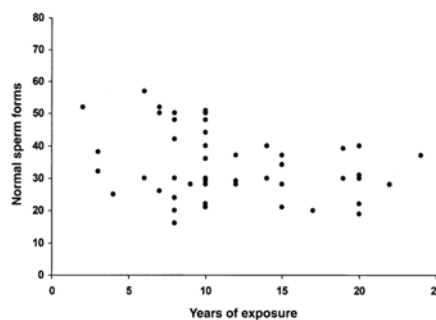
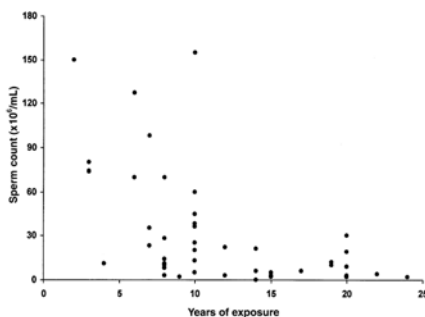
## METHODOLOGY

- Bibliographic research work.
- Sources of information:
  - Articles, articles reviews, thesis and reports on scientific search websites such as Google Scholar, Scirus, PubMed and Web of Knowledge.
  - Scientific books found in the library.
  - Information and experience acquired in university practices in *Institut Universitari Dexeus*.
  - Lectures attendance in the *39th International Symposium of Fertility 2012*.

## RESULTS

ENVIRONMENTAL POLLUTANT	EXPOSURE SOURCES	EFFECTS ON REPRODUCTION
Heavy Metal: Mercury (Minamata)	Contaminated food	Decreased semen quality - Abortions - Effects on fetal neurodevelopment
Heavy metal: Cadmium (Itai-Itai)	Tobacco - Industrial Activity	Decreased semen quality - Low birth weight - Preterm birth - Abortions
Heavy metal: Lead	Tobacco - Contaminated food - Combustion	Decreased semen quality - Effects on fetal neurodevelopment
Organochlorines: Dioxins (Seveso)	Contaminated food - Industrial Activity	Decreased semen quality - Decreased time of pregnancy - Endometriosis
Organochlorines: PCB	Industrial Activity - Incineration - Pesticides	Decreased semen quality - Shortened menstrual cycle - Abortions
Organochlorines: DDT/DDE	Contaminated food - Pesticides	Decreased semen quality - Preterm birth - Abortions - Advancement of menarche - Shortened menstrual cycle
Phenolic compounds: Bisphenol-A	Plastics	Decreased semen quality - Abortions - Genital malformations
Phenolic compounds: alkylphenols	Plastics - Detergents - Pesticides	Decreased semen quality - Reduced fetal weight
Phthalates	Plastics - Cosmetics - Paints	Decreased semen quality - Reduced fetal weight - Genital malformations
Pyrethroids	Pesticides	Decreased semen quality
Organophosphate	Pesticides	Decreased semen quality - Effects on fetal neurodevelopment
Aromatic hydrocarbons	Combustion - Tobacco - Contaminated food	Decreased semen quality - Reduced fetal weight
Particulate matter	Several sources of air pollution	Decreased semen quality

FIGURE: EFFECT OF THE DURATION OF HYDROCARBON EXPOSURE ON MALE FERTILITY



(De Celis R. et al., 2000)

## CONCLUSIONS

- Environmental pollution has negative effects on human fertility.
- The endocrine disruptors increase the risk of developing proper reproductive system.
- Given the difficulty of conducting research with female gametes, the results show a bias towards the association between exposure to pollution and loss of male fertility.
- There is a relationship between pollutants and certain professions or areas.
- The identification of the cellular and molecular mechanisms involved in the physiological response to exposure to contaminants is crucial in preventing reproductive diseases and allow us to intervene in the earliest stages of life development.
- It is important to raise public awareness on harmful effects to the reproductive health.

