



# Endo Compass

Research roadmap for  
better hormone health

## The EndoCompass Research Roadmap

Policy priorities for better hormone health in Europe

# Promoting endocrine health throughout life and in our environment

Why this matters for Europe:

- Hormones matter at every stage of life, from early development to older age.
- Some of Europe's most costly health challenges are linked to endocrine disruption, such as diabetes, obesity, thyroid disease, cancer, osteoporosis and infertility, and more than 440 rare endocrine diseases.
- Most Europeans will be affected by an endocrine-related condition in their lifetime, weakening our capacity to live, work and age well.
- Endocrine science is an investment in Europe's future.

# Promoting endocrine health throughout life and in our environment



## Why this matters

Europe's population is ageing rapidly and fertility is in decline.<sup>9</sup> In fifty years, the number of people aged 65 and over is expected to double, while those aged 80 and over will nearly triple.<sup>25</sup> Unhealthy life-years account for around a fifth of a person's life, due in part to common endocrine conditions such as obesity, type 2 diabetes, osteoporosis and thyroid disease, along with many rare endocrine diseases.<sup>25</sup>

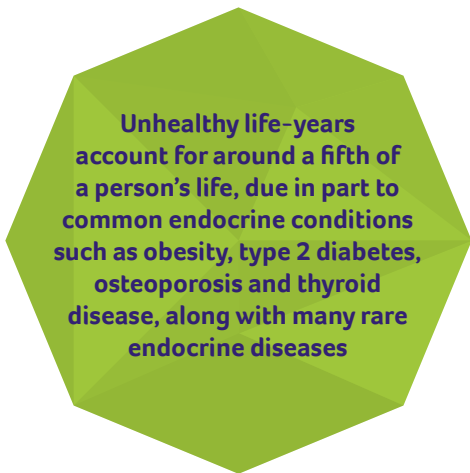
Age-related illness already costs Europe billions of euros each year. However, current interventions are often too late and too fragmented. As the number of older people and the age of retirement increase, preventing endocrine disease and understanding the role of hormones in ageing will be increasingly important to support long-term wellbeing and manage costs.

Health research and policy must recognise endocrine health as a lifelong process. Hormones are involved in foetal and childhood development, puberty, reproduction, menopause and ageing – but these should not be seen as isolated events. If something goes wrong at these key stages of development, there can be lifelong consequences. Similarly, many endocrine conditions that lead to disease and disability later in life begin much earlier. An integrated approach is essential to improve prevention, diagnosis and treatment.

## Environmental risks to hormone health

Our environment also has a strong impact on hormone health over time. Environmental exposures, such as endocrine-disrupting chemicals (EDCs), air and water pollution and pharmaceuticals, are known to interfere with hormone function.<sup>26</sup> Some forever chemicals accumulate in the body over time and even pass from one generation to the next. A 2026 US study found that babies are exposed to many more forever chemicals before birth than previously known.<sup>27</sup>

These exposures contribute to hormone-related cancers, reduced fertility in men and women, osteoporosis, thyroid disease, metabolic disorders such as diabetes and obesity, neurodevelopmental issues and birth defects. This public health crisis costs Europe between €157 billion and €270 billion each year in healthcare expenses and lost earning potential.<sup>28</sup> This excludes the projected costs of cleaning up the more than 2000 hotspots affected by per- and polyfluoroalkyl substances



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(PFAS) in Europe, which could cost more than €100 billion per year, with total costs exceeding €2 trillion over 20 years.<sup>29</sup> These figures are based on current pollution levels. If PFAS production and use is not stopped, the costs to society will be even greater.

The scientific consensus is clear: reducing environmental exposures will lower the risk of endocrine disease for current and future generations.

Europe cannot address its major public health challenges in isolation. This requires investment in endocrine research that treats fertility, ageing and environmental exposure as interconnected drivers of long-term health that have hormone disruption in common.

## Critical windows in endocrine health

Hormones are particularly sensitive to disruption during 'critical windows' of development, including foetal life, infancy, childhood, reproductive years and older age. However, these life stages are often underrepresented in clinical research because of ethical and practical challenges.

Children, women of reproductive age and older adults are frequently excluded, so less is known about how different treatments and medications could affect them. This makes it harder to deliver personalised care. Addressing these gaps requires research models that better reflect real-world populations, particularly in ageing societies.

## What research is needed?

### 1. Healthy ageing across the lifespan

Healthy ageing begins at (and even before) conception. In particular, critical windows in early life are crucial periods for the healthy development of endocrine and metabolic pathways. The EndoCompass Research Roadmap calls for integrated research that tracks endocrine health through conception, foetal life, infancy, childhood, puberty, reproduction, menopause and ageing, rather than treating these as separate topics. This should include a combination of basic research into mechanisms of ageing, major longitudinal studies and shorter-term clinical research into critical windows of development.

#### Key research priorities are:

- Early-life influences on ageing, including epigenetic programming, developmental origins of disease and endocrine aspects of healthy ageing.
- Stronger links between paediatric and adult endocrinology research to follow endocrine health over time and understand cross-generational effects.
- Improving care transitions so patients with chronic conditions are not 'lost to follow-up'.
- Brain-gut communication influencing appetite, metabolism and hormone regulation across the lifespan.
- Endocrine changes in ageing, including the impact of menopause and andropause.
- Endocrine health in older populations, including multimorbidity and the need to adjust diagnostic criteria of endocrine disorders to different phases of ageing.
- Real-world registries, biobanks and big data analyses to understand life-course influences on health span and improve care in older populations.

### 2. Fertility and early development

Infertility affects about 16.5% of the adult population in the World Health Organization European Region.<sup>7</sup> The EndoCompass Research Roadmap notes that despite the societal impact, research in fertility and reproductive health is underfunded.

#### Future investment should focus on:

- Understanding how hormonal regulation before conception, during pregnancy and in early life influences fertility, reproductive function and later health.
- Clarifying links between early endocrine disruption and infertility, pregnancy complications and reproductive disorders.
- Improving diagnosis, hormonal treatments and fertility preservation, with emphasis on pan-European registries, novel technologies and environmental influences.

### 3. Endocrine effects of environmental exposures

The EndoCompass Research Roadmap also addresses the impact of increasing human exposure to EDCs, microplastics and other environmental factors on the endocrine system, particularly long-term and transgenerational effects. The main data gaps and research needs are:

#### Endocrine-disrupting chemicals

- Targeted research to identify which populations are most vulnerable to exposure.
- Further investigating links between EDC exposure and infertility, neurodevelopmental conditions, obesity, cancer, diabetes and other endocrine disorders, using omics, epigenetics and epidemiological studies.
- More follow-up and longitudinal studies to understand links between exposure, genes and health.
- Increasing our understanding of the (long-term) effects of PFAS for health and well-being.

#### Pharmaceuticals

- Researching how pharmaceuticals enter the environment and how contamination can be prevented.
- Extended research into drug mechanism pathways to identify potential endocrine-disrupting and transgenerational effects.

#### Endocrine effects of climate change and pollution

- Applying a 'One Health' approach to explore links between climate, pollution, biodiversity, food and endocrine diseases. This approach describes the connections between human, animal and environmental health, calling for cross-sector collaboration in response.
- Studying effects of climate change on metabolism, thyroid, reproduction and food quality.

#### Environmental stress

- Investigating stress-related endocrine effects, including sex differences and puberty timing.
- Using registries and artificial intelligence-based analysis to explore early-life influences on endocrine ageing.

For more information on proposed research priorities in these areas, please refer to:

- [EndoCompass project: endocrinology across the lifespan](#)
- [EndoCompass project: research roadmap for reproductive and developmental endocrinology](#)
- [EndoCompass project: environmental endocrinology](#)



# EndoCompass

Research roadmap for better hormone health

Investing in hormone health is one of the most effective ways for Europe to prevent and manage disease, support healthy ageing and sustain its health systems and economy.

The endocrine community calls on policymakers to deliver the EndoCompass recommendations and ensure a healthier, more resilient Europe.

To discuss the recommendations in this paper or related policy engagement activities, please contact ESE by emailing: [info@ese-hormones.org](mailto:info@ese-hormones.org)

*EndoCompass Research Roadmap – Directions for the Future of Endocrine Science* was developed as a joint initiative of the European Society of Endocrinology and the European Society for Paediatric Endocrinology. It is published as an open-access supplement in the *European Journal of Endocrinology* and the *Hormone Research in Paediatrics* journal.

Find out more about the EndoCompass Research Roadmap : [ese-hormones.org/endocompass](https://ese-hormones.org/endocompass).

This document is an extract from *The EndoCompass Research Roadmap – Policy Priorities for Better Hormone Health in Europe*, a wider set of policy recommendations for improving hormone health across Europe. Read the full paper: [ese-hormones.org/endocompass-policy-paper](https://ese-hormones.org/endocompass-policy-paper)

## References\*

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\*Reference numbers follow the numbering used in the full paper.



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