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Towards human-centric biomedical research: impacts and perspectives for public health

To accelerate the integration of innovative non-animal methods in biomedical and preclinical research, a cultural transformation is necessary



Despite significant advances in biomedical research, many common diseases, such as cardiovascular, oncological, metabolic, neurodegenerative conditions, along with mental disorders, continue to pose a major challenge to public health. Recent data shows that, in Europe, diseases such as **cardiovascular afflictions** and **cancer** are collectively responsible for about [54 percent of deaths](#). In addition, the emergence of new **infectious diseases** and the increasingly critical threat of [antimicrobial resistance](#) (AMR) will both require timely and coordinated responses from researchers, policymakers, and institutions.



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Our heavy reliance on **traditional models**, such as animal models and simplified experimental systems that are unrepresentative of human biology and physiology, has proven to have **limited translatability to human clinical contexts**. This is reflected, for example, in the high failure rates in the development of drugs for diseases such as cancer and [Alzheimer's](#), with success rates often below [10 percent](#).

The need for a paradigm shift

In recent years, the landscape of biomedical research has been undergoing a radical transformation, with a growing push towards **human-centric approaches**. These include advanced methodologies such as microphysiological systems (MPS), in silico (computational) technologies, and other innovative methodological approaches (New Approach Methodologies, or Non-Animal Methods, NAMs), which are more representative of human biology.

The [European Commission](#) recently proposed an action within the European Research Area (ERA) to promote the use of such approaches, emphasizing a clear commitment to research that is more relevant to humans. A further step forward has been made in the **Netherlands**, with the approval of 124.5 million euros in funding for the establishment of the “Centre for Animal-Free Biomedical Translation” at [Utrecht University](#). Additionally, the **United States** has launched the “[Complement-ARIE](#)” initiative, a decade-long, 400-million-dollar programme aimed at accelerating the development of NAMs.

These examples represent concrete signs of a paradigm shift. However, to ensure that this transition leads to a **real impact on public health**, it is necessary to address several fundamental questions.

- How can we ensure that these new approaches have translational relevance, i.e., that they generate data useful for the creation of new pharmacological and non-pharmacological interventions, therapies, diagnostics, or public health interventions that are truly effective for humans?
- What infrastructures are needed to support the adoption of innovative technologies?
- How can we ensure that the research funded has a measurable and tangible impact on society and public health?



The role of the BioMed21 Collaboration

These topics were at the heart of the recent workshop convened by the Biomedical Research for the 21st Century (BioMed21) Collaboration in Brussels on November 18, 2024. That event brought together researchers, representatives from government institutions, scientific organisations, and other interested parties to discuss strategies and priorities aimed at enhancing the impact of biomedical research on people's health. Among the main **objectives** of the workshop were:

- identifying unmet medical needs (UMNs) in the medical and healthcare fields that could benefit from interdisciplinary collaboration;
- exploring the value of innovative methodologies and their integration into research;
- promoting educational initiatives aimed at training a new generation of researchers skilled in human-centric methods.

The workshop also highlighted the importance of **standardising** these new technologies and the crucial role of scientific journals in disseminating studies with translational impact.

Towards more inclusive and health-oriented research

The discussions that emerged during the workshop highlighted the need for transformative policies that promote **science-driven research focused on human health**. An important step will be the creation of a **consensus report**, based on the workshop's outcomes, which will include strategic recommendations to guide the implementation of the Horizon Europe research and innovation funding programme and the definition of the next framework programme, FP10.

Ultimately, the future of biomedical research will increasingly rely on our ability to embrace innovative approaches, supported by multidisciplinary collaborative strategies, capable of tackling global challenges with **scientifically advanced and socially responsible tools**.

However, to truly accelerate the integration of NAMs into biomedical and preclinical research, a **cultural transformation** is needed. There must be a shift in mindset and methodology that embraces advanced, ethical, and human-centric scientific approaches. This change involves not just the adoption of new techniques, but a **redefinition of our values, standards and frameworks** to reflect a future-oriented, scientifically sound and human-centric vision.



In summary, improving the translation and impact of research means overcoming bottlenecks between science and its practical implementation by using strategic approaches that ensure research results are relevant, applicable, and focused on the well-being of society.

This transformation represents a unique opportunity to align **scientific innovation** with **ethical progress**, redefining the principles and objectives of research in order to maximize its impact on public health and **global well-being**. It is a call for change that goes beyond technical procedures, requiring a radical rethinking of the priorities and aspirations of the scientific community.

