



**Human  
Microbiome  
Action**

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## **PROPERLY TARGETING HUMAN MICROBIOMES TO IMPROVE PUBLIC HEALTH**

The Human Microbiome Action project addresses pressing challenges faced in public health, like the increasing number of non-communicable diseases. Human microbiomes can provide diagnostic and prognostic elements but also serve as a target for disease prevention and treatment. Anticipating a future where clinicians can effectively utilise microbiome information in daily clinical management, the EU-funded Human Microbiome Action project aims to provide the necessary knowledge and technological framework to achieve this goal.

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# CURRENT TOOLS AND GUIDELINES TO TARGET HUMAN MICROBIOMES IN PUBLIC HEALTH



## ASSESSMENT METHODS:

Current methods to analyse human microbiomes include a range of options from laboratory culture to molecular probing or sequencing and rely on cutting-edge molecular biology associated with data-science expertise. These require specific caution to minimise biases and could be part of a broader account of the state of the host-microbe relationship integrating microbiome features and more common medical biology. Although the appropriate methods may be available, efforts are needed to implement them within the clinical context to document the actual clinical benefits of microbiome features in the decision-making process.



## CONTEXTUALIZATION:

Human Microbiome Action emphasises the importance of putting data on human microbiomes into context, considering, amongst others, factors such as age, nutrition, drug use, and clinical indications.



## MICROBIOME MODULATION OPTIONS:

The current strategies for targeting human microbiomes extend beyond traditional methods. They encompass a variety of approaches such as:

### 1 **Nutritional Tools:**

Tailored dietary plans and specific nutrients that can positively influence or modify the microbial composition.

### 2 **Lifestyle Modifications:**

Targeting factors such as exercise, sleep patterns, and stress management have been shown to influence human microbiomes.

### 3 **Environmental and Ecological Approaches:**

Addressing external factors like pollution or climate, which can indirectly affect human microbiomes.

### 4 **Food-Grade Bioactive Compounds:**

Natural substances found in food or food components, like e.g. prebiotics and probiotics, which can beneficially modify human microbiomes and host-microbes symbiosis.

### 5 **Synbiotics:**

A combination of probiotics and prebiotics that work synergistically to enhance human microbiome health.

### 6 **Genetic and Molecular Tools:**

Advanced techniques like CRISPR gene editing and molecular engineering to directly modify the microbiome at a genetic level.

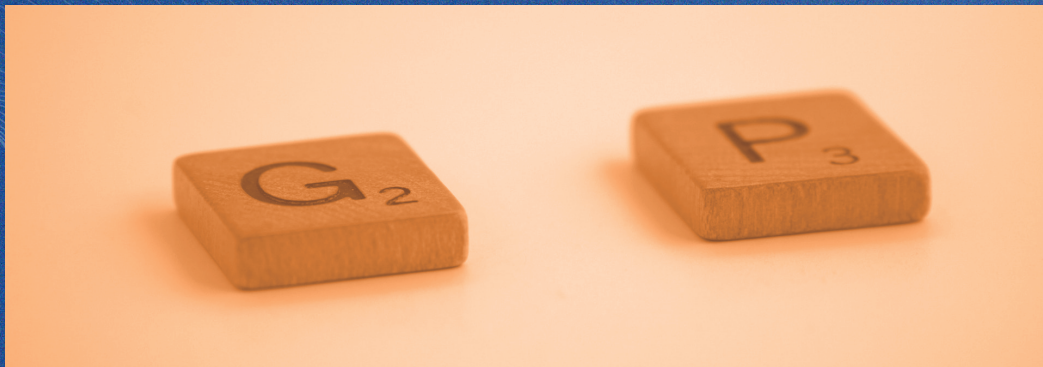
### 7 **Pharmaceutical Interventions:**

These include not only drugs specifically designed to alter the microbiome but also standard medications that indirectly impact microbial populations.

### 8 **Microbiota Transfer Techniques:**

Medical procedures like faecal microbiota transfer, where the stool from a healthy individual is transferred to a patient. The goal is to restore a balanced microbial community.

# ADDRESSING KNOWLEDGE GAPS



## STANDARDISATION OF ANALYTICAL METHODS:

Human Microbiome Action focuses on improving study designs and reporting to facilitate the accumulation of robust knowledge. The project helps to define critical elements of **clinical studies and analytical methods** needed to provide evidence of the usefulness of microbiome-based biomarkers and the benefits of microbiome-targeted interventions.

## RECOMMENDATIONS FOR MICROBIOME-BASED BIOMARKER QUALIFICATION:

Human Microbiome Action is actively developing recommendations for microbiome-based biomarker identification, verification, and qualification, supporting precise and targeted interventions.

## DATA REPOSITORY:

Access to a centralised and publicly available human microbiomes data repository allows easy classification and stratification for enhanced research insights. The Human Microbiome Action project provides an overview and proposes initiatives of independent unified repositories and resources for human microbiomes summary data.

## ACCOUNTING FOR CONFOUNDING FACTORS IN MICROBIOME STUDIES:

Increasing the knowledge of the context of microbiome data will help the comprehension of its role in human health. The Human Microbiome Action project aims to identify key confounders influencing human microbiomes, ensuring accurate data interpretation.

# RECOMMENDATION FOR FUTURE FOCUS AND COLLABORATIVE ACTIONS

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## FUNDING PRIORITIES:

Recommending and identifying relevant funding priorities will shape the future landscape of microbiome research.

## DATA SHARING:

Promoting open data sharing ensures access to a broader range of information and advances research outcomes.

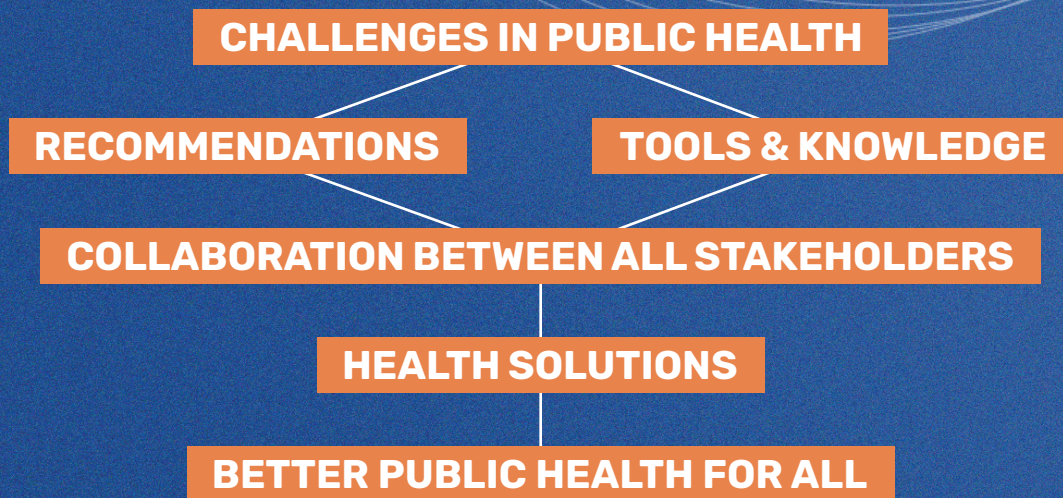
## EQUITY IN HEALTH:

Human Microbiome Action advocates for inclusive and representative microbiome research, considering all populations worldwide to promote equitable health outcomes.

## DATA INTERPRETATION GUIDELINES:

A comprehensive list of guidelines for interpreting microbiome data is needed to enable public health experts with more informed decision-making.

# THE FUTURE OF PUBLIC HEALTH



The EU-funded project Human Microbiome Action actively addresses challenges in public health, by providing valuable recommendations and developing the tools and knowledge to propel the field forward. Recognising the importance of the microbial “part” of our fellow humans is essential, and collaboration between all stakeholders and data-driven actions will be pivotal in harnessing the potential of microbiome research for improved health outcomes. By properly targeting human microbiomes, we can implement ground-breaking health solutions, transforming the clinical approach and shaping a better public health for all.

For further information, please visit our website ([humanmicrobiomeaction.eu](http://humanmicrobiomeaction.eu)), and follow the [@SciFoodHealth](https://twitter.com/SciFoodHealth) [Twitter](#) and [LinkedIn](#) accounts. Visit our [zenodo.org](https://zenodo.org) community for all published and upcoming scientific publications or join the Stakeholder’s Advisory Board and provide strategic advice from an external point of view.

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