

The **Quadram Institute** is at the heart of the Norwich Research Park, capitalising on its world-class cluster of bioscience institutes. QI is bringing together scientists and clinicians under one roof in a new state-of-the-art building, combining interdisciplinary research teams from the Institute of Food Research and the University of East Anglia with the Norfolk and Norwich University Hospitals NHS Foundation Trust Clinical Research Facility and Regional Endoscopy Centre.

The **Quadram Institute** will work closely with UK and international partners in academia, the pharmaceutical industry and the healthcare arena to significantly progress research into the microbiome, building our fundamental understanding and driving the translation of this research to deliver innovative products and therapies.

The **Quadram Institute** Microbiome Research will benefit from:

- ◆ Europe's largest gastrointestinal endoscopy centre, screening and treating 40,000 patients each year and within the same building as QI bioscience researchers, enabling the closest possible integration between research and clinical practice.
- ◆ A brand new clinical research facility, enabling clinical trials, driving the translation of research into new therapies.
- ◆ A partnership with the NHS, the world's largest healthcare provider, through one of its largest hospitals, facilitating direct access to care at all levels.
- ◆ The Norwich Research Park Biorepository, in the neighbouring medical research building, for the banking of and access to diseased and healthy human tissue.
- ◆ The neighbouring Earlham Institute, dedicated to decoding living systems through the application of computational science and bioinformatics, support by the latest high throughput sequencing and genome analysis technologies.

- ◆ Close working with The John Innes Centre, world leaders in plant and microbial research.
- ◆ Expertise and facilities supporting a full range of *in vitro* gastrointestinal tract models, including cell culture systems, organoid systems, animal models, transgenic mouse and gnotobiology facilities, as well as *in silico* modelling expertise.
- ◆ Significant expertise in microbial genetics, comparative genomics, meta-genomics, transcriptomics, metabolomics, and systems biology, and their application to large, interdisciplinary research projects.
- ◆ Strategically funded research programmes in partnership with other leading UK centres for microbiome research, including Imperial College and Queen Mary University London and St Mark's University Hospital.
- ◆ Networks spanning the UK, Europe and the world, with the biopharma and food industries, and with government and regulators.

The **Quadram Institute** hosted, with the New York Academy of Sciences, an international conference at the Royal Society in London, on Food-Microbiome Interactions. A briefing is available on the NYAS [website www.nyas.org/FoodMicrobiome-eB](http://www.nyas.org/FoodMicrobiome-eB)



[Quadram.ac.uk](http://Quadram.ac.uk)  
[info@quadram.ac.uk](mailto:info@quadram.ac.uk)

## At the forefront of a new era of food and health research: Understanding the microbiome

The Quadram Institute (QI) will create a new interface between gut biology, human health, food science and disease and develop solutions to worldwide challenges in health and food-related disease.

QI will aim to understand how food and the gut microbiome are linked to the promotion of health and the prevention of disease, with an emphasis on ageing and diet-related diseases.

QI will use this knowledge to develop solutions to global challenges in disease and human health, to extend healthy lifespan and reduce the burden of care upon health systems worldwide.

**How is a healthy microbiome established?**

**How does the microbiome influence health?**

**How can we alter the microbiome to improve health?**



Science • Health •  
Food • Innovation

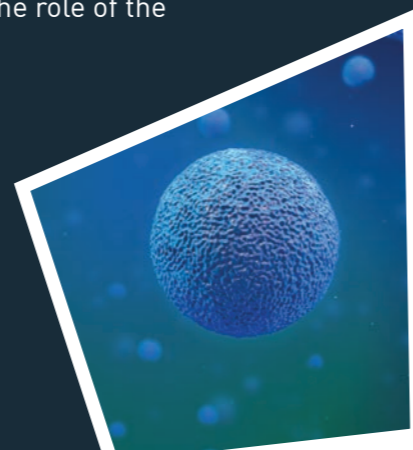
# Research Overview

The **Quadram Institute** provides an opportunity to assemble the necessary research and translational elements needed to understand the human microbiome and its impact on health.

Our approach is to understand the interactions within the microbiome, with the human body, with food, and with the wider environment. Understanding how these interact will give a full understanding of the role of the microbiome in health.



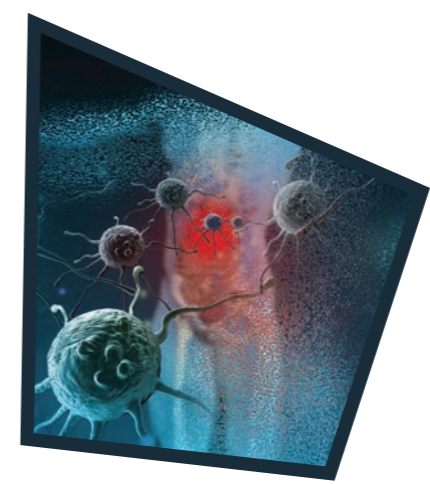
**1 The gene**  
Advanced bioinformatics and other 'omics technologies  
Evolution of virulence genes



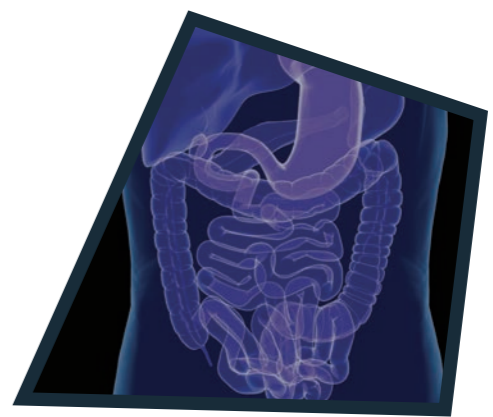
**2 The cell**  
Biology of gut microbes  
Understanding bacterial pathogens, soil to plate



**3 Microbial interactions and quorum sensing**  
Development and spread of antimicrobial resistance in bacterial communities.  
Persistence of pathogen populations in the food chain  
The virome  
Yeasts



**4 The microbiome and gut health**  
Interkingdom cross talk and host:microbiome interactions  
Microbiome establishment  
Epithelial interactions  
Mucosal adherence  
Prevention of infection



**5 The gut, microbiome and human physiology**  
Maintenance of a healthy microbiota  
How foods modify the gut microbiota  
How the microbiota metabolise food  
Causes and effects of dysbiosis  
Understanding the gut-liver axis  
Maintaining a healthy ageing gut



**6 The gut microbiome and the nervous system, brain and behaviour**  
Gut and brain signalling networks  
Microbial cues driving hunger and satiety  
Microbiota-Enteric Nervous System interactions  
Gut, microbiome and mental health



**7 Human physiology and diet**  
Interplay between food and the gut microbiome  
Influence on food preferences and hypersensitivities  
Impact of food structure on digestion and nutrient release



**8 Individual health**  
Personalised nutrition  
SMART foods  
Resistant starch, increased bioavailability of bioactives and metabolites  
Bacteriotherapy (including FMT, probiotics, engineered and synthetic microbes and phage therapy)



**9 Local population trials**  
Variation in the gut microbiota of the local Norfolk (ageing) population  
Clinical Research  
Dietary intervention trials  
Interactions with primary healthcare providers  
Regional Endoscopy Centre



**10 Frontier Bioscience for the UK**  
A centre for UK microbiome and food research  
Innovative foods and therapies, benefiting societal health  
Enhancing the health of the population, reducing the burden on healthcare providers  
Dementia research



**11 Addressing global challenges**  
Addressing global challenges of increase in non-communicable disease, especially in low and medium income countries.

**LIFELONG HEALTH**