PhD Advert Template

Project title: Development of bioinks to bioprinit an *in vitro* model of the gut mucosa

Project ID *(optional)*:

Accept all year-round applications

Funding information: Self-funded students only

Project description: This research aims to study the influence of inflammatory bowel disease (IBD) on the onset of ankylosis spondylarthritis (AS) through 3D *in vitro* modelling of the synovium and gut, in healthy and inflamed states, assessing changes in cell phenotypes and cytokine production. IBD is a chronic disorder of the gastrointestinal tract characterized by intestinal inflammation and epithelial injury often cause by bacterial infection. In the UK around 620k people are affected by it, translating in NHS costs of £1 billion per year1–3

. Clinically, up to 35% of patients with IBD display musculoskeletal disorders such as axial and peripheral arthritis syndrome, inferring that these two pathologies are connected. To study how the gut reacts to bacteria (indirect and direct) a 3D model of the gut mucosa will be created using bioprinting and novel biomaterials. This gut model will be subjected to inflammatory stimulus provoked by direct exposure to bacteria metabolites and inflammatory cytokines produced by the immune cells in the host. This is key to study the exchange of biological factors and the permeability of the finalised system and ensure the model functions as the normal gut.

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References (optional):

1. Ashrafi, M., Kuhn, K. A. & Weisman, M. H. The arthritis connection to inflammatory bowel disease (IBD): Why has it taken so long to understand it? *RMD Open* **7**, 1–9 (2021).

2. Trujillo-de Santiago, G., Lobo-Zegers, M. J., Montes-Fonseca, S. L., Zhang, Y. S. & Alvarez, M. M. Gut-microbiota-on-a-chip: an enabling field for physiological research. *Microphysiological Syst.* **2**, 7 (2018).

3. Neurath, M. F. Cytokines in inflammatory bowel disease. *Nat. Rev. Immunol.* **14**, 329–342 (2014).

Application enquires: [Dr. Priscila Melo](mailto:priscila.melo@newcastle.ac.uk)[*https://www.ncl.ac.uk/engineering/staff/profile/priscilamelo.html*](https://www.ncl.ac.uk/engineering/staff/profile/priscilamelo.html)

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livestock farming

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landscape architecture

rural planning

surveying

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other

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behavioural biology

biochemistry

biodiversity

bioinformatics

biophysics

biotechnology

cancer biology

cell biology

developmental biology

ecology

ecotoxicology

entomology

environmental biology

evolution

genetic engineering

genetics

genomics

human genetics

immunology

marine biology

microbiology

molecular biology

molecular genetics

neuroscience

parasitology

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structural biology

systematic biology

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pharmaceutical chemistry

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digital media

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production

public relations

publishing

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computer vision

computer graphics

cyber security

data science

human computer interaction

internet of things

machine learning

networks

quantum computing

software engineering

videogames

other

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animation

art

crafts

creative writing

dance

design

drama

fashion

film studies

fine art

graphic design

interior design

music

music technology

photography

theatre studies

other

Economics

econometrics

financial economics

macroeconomics

microeconomics

political economics

other

Education

further education

higher education

nursery education

primary education

secondary education

special needs education

other

Engineering

acoustics engineering

aerospace engineering

atomic engineering

automotive engineering

bioengineering

biomedical engineering

chemical engineering

civil engineering

communications engineering

control systems

cybernetics

dynamics

electrical engineering

electronic engineering

energy technologies

environmental engineering

fluid mechanics

gas engineering

geotechnical engineering

integrated engineering

manufacturing engineering

marine engineering

mechanical engineering

mechanics

mechatronics

nanotechnology

offshore engineering

petroleum engineering

robotics

solid mechanics

structural engineering

structural mechanics

systems engineering

thermodynamics

other

Environmental Sciences

climate science

hydrology

marine sciences

meteorology

pollution

soil science

other

Finance

actuarial science

banking

financial management

insurance

investment

taxation

other

Food Sciences

food hygiene

food production

other

Forensic and Archaeological Sciences

archaeological science

forensic science

other

Geography

agricultural geography

cultural geography

economic geography

environmental geography

geographical information systems gis

historical geography

human geography

marine geography

physical geography

political geography

remote sensing

social geography

transport geography

urban geography

other

Geology

applied geology

geochemistry

geophysics

geoscience

geotechnology

hydrogeology

marine geology

palaeontology

seismology

volcanology

other

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american history

ancient history

archaeology

asian history

australasian history

british and irish history

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european history

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history

history of art

history of religions

history of science

medieval history

military history

modern history

russian history

social history

world history

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Information Services

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information systems

librarianship

other

Languages, Literature & Culture

african studies

american studies

asian studies

australasian studies

chinese

danish

dutch

english language

english literature

european studies

finnish

french

german

italian

japanese

middle eastern studies

norwegian

portuguese

russian

spanish

swedish

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Law

criminal law

commercial law

contract law

property law

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Linguistics & Classics

ancient greek

celtic studies

classics

latin

linguistics

other

Materials Science

ceramics

glass

metallurgy

polymers

textiles

other

Mathematics

applied mathematics

applied statistics

computational mathematics

data analysis

engineering mathematics

mathematical modelling

medical statistics

operational research

probability

pure mathematics

statistics

stochastic processes

other

Medicine

anatomy

audiology

biomechanics

cardiology

complementary medicine

dentistry

endocrinology

epidemiology

neural engineering

neurology

nutrition

ophthalmology

optometry

pathology

pharmacology

pharmacy

physiology

physiotherapy

podiatry

radiology

speech science

tissue engineering

toxicology

other

Nursing & Health

adult nursing

community nursing

counselling

dental nursing

environmental health

health informatics

medical nursing

mental health nursing

midwifery

occupational health

occupational therapy

paediatric nursing

paramedical science

surgical nursing

other

Philosophy

ethics

metaphysics

philosophy of science

other

Physics

acoustics

astronomy

astrophysics

chemical physics

computational physics

electromagnetism

environmental physics

experimental physics

medical physics

nuclear physics

optical physics

particle physics

quantum mechanics

solid state physics

space science

theoretical physics

other

Politics & Government

development studies

government

international relations

politics

public policy

other

Psychology

child psychology

clinical psychology

community psychology

counselling psychology

developmental psychology

educational psychology

forensic psychology

health psychology

neuropsychology

occupational psychology

organisational psychology

psychotherapy

sport psychology

other

Sociology

criminology

disability studies

gender studies

socio economics

social work

other

Sport & Exercise Science

sport coaching

sport development

sport performance

sport technology

sport therapy

other

Theology & Religious Studies

divinity

religious studies

theology

other

Veterinary Sciences

animal welfare

veterinary dentistry

veterinary medicine

veterinary nursing

veterinary nutrition

veterinary pathology

other