European Research Council
Established by the European Commission

European Commission

ERC frontier research contribution to EU4Health

The European Research Council (ERC) follows a strictly bottom-up approach to funding research proposals, with excellence as the sole criterion for selection. The research that ERC grantees pursue, free of any thematic objectives, generates results that address a wide range of issues with significant socioeconomic, environmental and policy relevance. As a result, this rich and diverse portfolio of frontier research generates new knowledge and proposes concrete solutions for addressing some of the most pressing policy priorities of the European Commission. This is the case for the over 2000 projects funded by the ERC, worth more than €4 billion, in the Horizon 2020 (H2020) Framework Programme (2014–2020) that are relevant for 'EU4Health'.

Data as of December 2021

ERC frontier research contribution to EU4Health

This fact sheet provides an overview of the projects relevant for the selected areas of EU4Health.
The projects were funded under the Starting Grant (StG), Consolidator Grant (CoG), Advanced Grant (AdG) and Synergy Grant (SyG) schemes launched in the H2020 Framework Programme (2014–2020)*

Areas of interest for EU4Health

- Cancer
- COVID-19
- Other non-communicable diseases
- Infectious diseases
- Public health and healthcare
- Tools, therapies and digital health
- Other health-related research
- Brain and human mind research

2281 ERC-funded projects, worth **€4613 million**

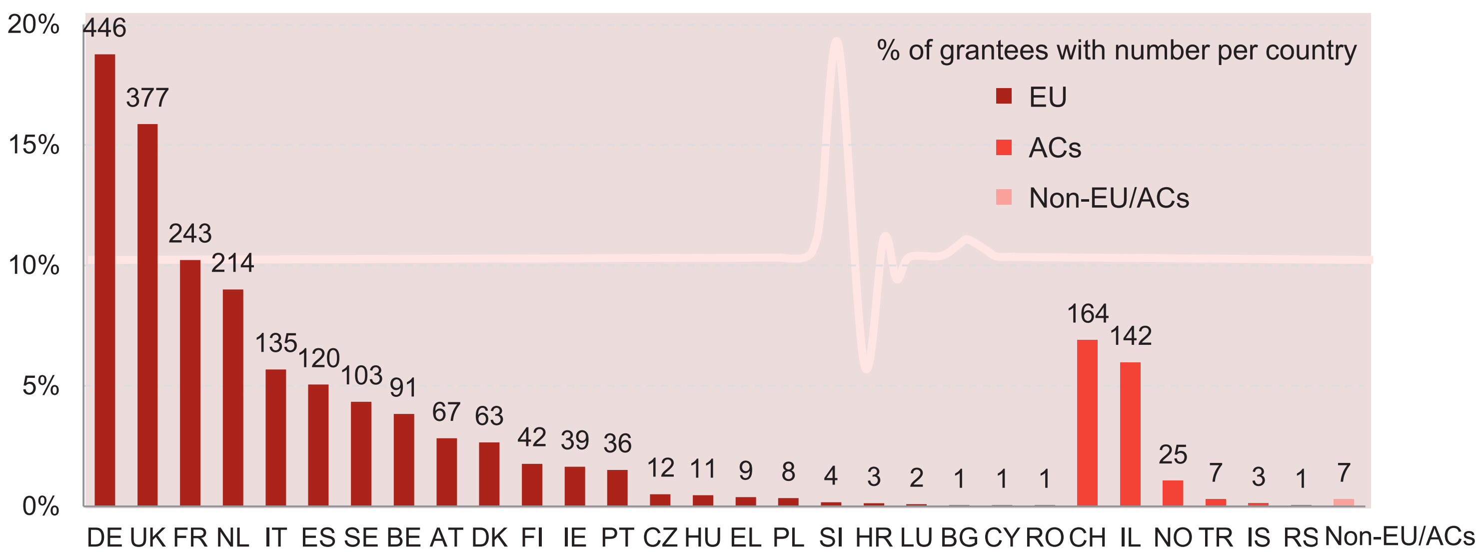
Physical sciences and engineering
408 projects, €844M

Life sciences
1482 projects, €3046M

Social sciences and humanities
391 projects, €723M

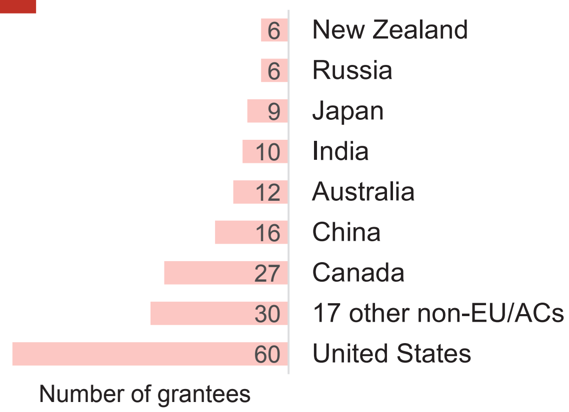
Distribution of ERC-funded projects in Horizon 2020

2377 grantees lead 2281 projects and are based in 23 EU Member States, 6 Associated Countries (ACs) and 3 non-EU/ACs



Host institutions with ≥37 funded projects

Country of origin of grantees other than EU or ACs (≤4 grouped together)



*Data as of December 2021

The scientific landscape of frontier research projects contributing to the selected EU4Health areas

Biochemistry
Molecular biology
Pathophysiology
Epigenetics
Tumourigenesis
Cell biology
Drug design and delivery
Cancer
Immunology
Genetics
Cell differentiation

Cancer

527 projects, €1082 million

Metabolic diseases
Inflammation
Immunology
Metabolism
Cardiovascular systems
Regenerative medicine
Pathophysiology
Cell biology
Immunological disease mechanisms
Cell differentiation
Genetics

Other non-communicable diseases

280 projects, €550 million

Immunology
Genetics
Mechanisms of infection
Structural biology
Drug resistance
Microbiology
Evolutionary biology
Viruses
Infectious diseases
Cell biology
Bacteria
Molecular biology

Infectious diseases

222 projects, €438 million

Economics
Microbiology
Epidemiology
Genetics
Adaptive immunity
Immunology
Mechanisms of infection
Structural biology
Infectious diseases
Cell biology
Viruses
Neuroscience

COVID-19

192 projects, €420 million

Cell biology
Neural development
Neurological disorders
Neural cell function
Cognitive psychology
Clinical psychology
Neuroscience
Cognitive neuroscience
Psychiatric and psychological disorders
Neural basis of cognition
Systems and computational neuroscience

Brain and human mind research

600 projects, €1232 million

Metabolic diseases
Pathophysiology
Health care
Demography
Public health
Sociology
Epidemiology
Ageing
Metabolism
Genetics
Neuroscience

Public health and healthcare

316 projects, €618 million

Optical devices and systems
Diagnostics
Biophysics
Biomaterials
Neuroscience
Pharmacology
Biomedical engineering
Drug design and delivery
Personalised medicine
Materials engineering
Cancer
Biological, medicinal chemistry

Tools, therapies and digital health

678 projects, €1392 million

Genetics
Epigenetics
Molecular interactions
Structural biology
Molecular biology
Cell differentiation
Cell biology
Biochemistry
DNA biology
Developmental biology

Other health-related research

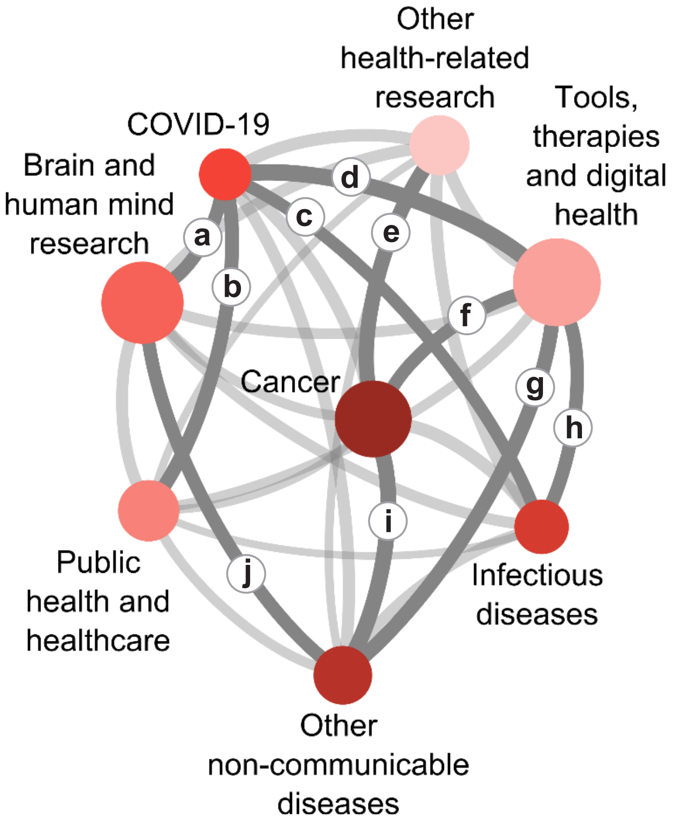
299 projects, €590 million

The word clouds represent the most prevalent scientific fields in the pool of ERC projects identified as relevant for each of the selected areas of EU4Health. The total number of projects under each area as well as the budget are indicated. 30% of the 2281 projects contribute to two or more of these areas.

Scientific synergies and methodological developments in the selected EU4Health areas

Scientific synergies among EU4Health areas

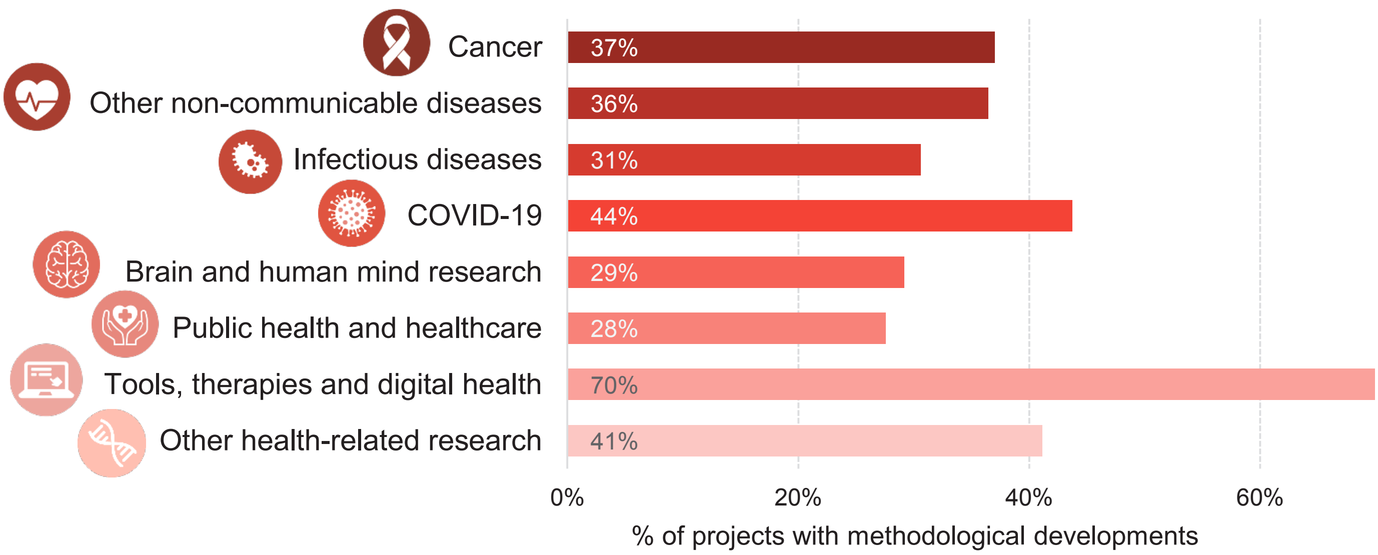
The nodes represent the selected areas of EU4Health and their size is proportional to the number of projects. These areas are interconnected and the strength of this connection is represented by the thickness of the arc, which is proportional to the number of shared scientific fields. The most representative scientific fields for the main connections, highlighted with letters, are listed.



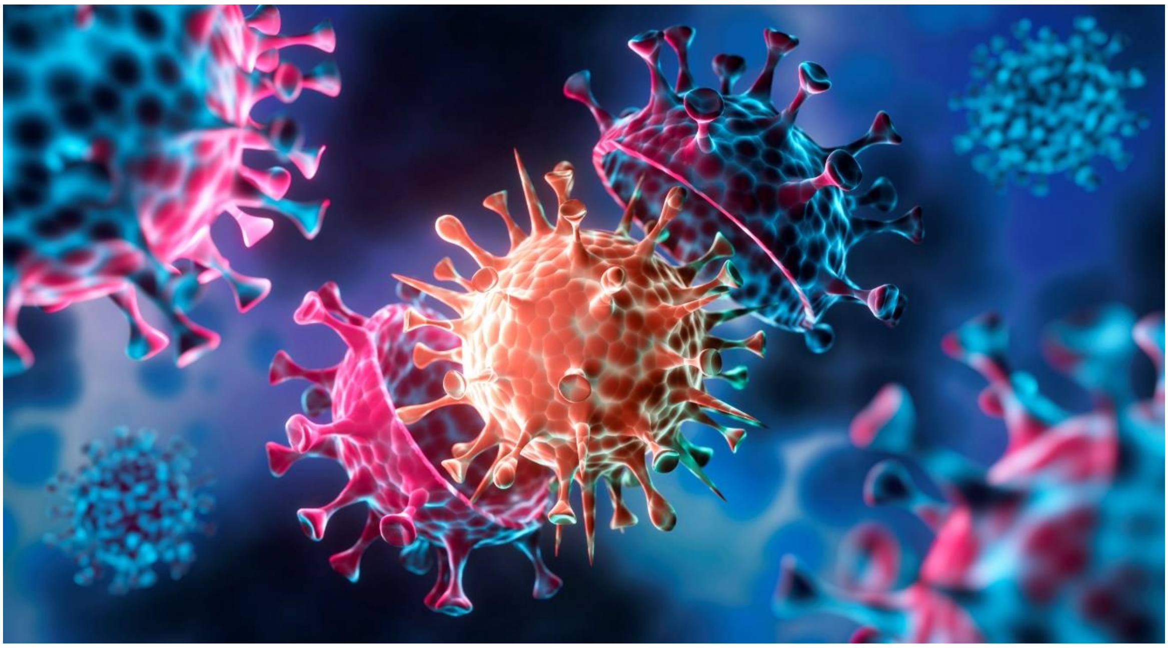
- **a** Immunology; Genetics, Cell biology; Structural biology; Neuroscience
- **b** Genetics; Immunology; Cell biology; Economics; Epidemiology; Neuroscience
- **c** Immunology; Infectious diseases; Microbiology; Genetics; Cell biology; Structural biology; Epidemiology
- **d** Immunology; Genetics; Cell biology; Microbiology; Infectious diseases; Structural biology
- **e** Molecular biology; Cell biology; Genetics; Structural biology; Biochemistry; Immunology
- **f** Cancer; Biomedical engineering; Diagnostics; Immunology; Pharmacology; Stem cells, regeneration
- **g** Immunology; Cell biology; Genetics; Regenerative medicine; Biomedical engineering; Diagnostics; Molecular biology
- **h** Immunology; Cell biology; Genetics; Molecular biology; Structural biology
- **i** Immunology; Pathophysiology; Cell biology; Genetics; Biomedical engineering; Diagnostics; Molecular biology
- **j** Cell biology; Genetics; Pathophysiology; Biomedical engineering; Diagnostics; Molecular biology

Methodological developments in projects contributing to the selected EU4Health areas

The main methodological development in the projects relevant for the selected EU4Health areas is in the field of *Computational modelling, simulations* with in silico model and machine learning being the focus. Other prominent methodological developments are *Experimental methods* with a focus on imaging and microscopy and *Animal models* with a focus on humanized and engineered mouse models.



Examples of projects contributing to the selected EU4Health areas



ERC grantee Irmela Jeremias' LeukaemiaTargeted project focusses on effective leukaemia treatment. Their work introduces molecular target validation as an important step for precision medicine.

At the University of Cyprus, Triantafyllos Stylianopoulos focusses on biomechanical aspects of tumour microenvironment to predict immunotherapy outcome. Their team developed a mathematical model for this Immuno-Predictor project that was also used to study COVID-19 disease progression.

Nuria Montserrat studies kidney diseases and in particular how to regenerate mammal's kidneys by modelling genetic kidney disorders. The engineered mini-organs developed with the REGMAMKID project have served as model to study SARS-CoV-2 infection.

With vAMRes, Rino Rappuoli originally tackled antibiotic resistance through the technology of reverse vaccinology, which was then used to screen for preventive and therapeutic tools against SARS-CoV-2.

Csaba Pál's resistance evolution project and its proof of concept Aware provide unprecedented knowledge about antibiotic resistance evolution and tools to identify at an early stage of drug development antibiotic agents that are less prone to resistance growth.

Madeleine Lowery's DBSModel project and its proof of concept DBScontrol aimed at improving the control of Parkinson's disease symptoms by advancing the use of closed-loop deep brain stimulation.

Examples of projects contributing to the selected EU4Health areas

Juergen Knoblich's MiniBrain generated brain organoids, a highly cost-effective tool in the discovery and development of therapies for neurodegenerative and developmental diseases.

The AGNES project studied the determinants and modifiers of active ageing, including a study on the quality of life during COVID-19 pandemic.

Maria Collado studies the mechanisms behind the protective role of maternal microbes on the baby's health. Their MAMI project opens up possibilities for research and applications in the field of personalized nutrition and medicine, for mothers and infants.

SmartCardiacPatch engineered a miniature heart, 3D-printed using biological materials from human patients, together with the next generation smart implantable cardiac patches to enable monitoring the organ in real-time.

Daniel Miller leads a world-wide SmartPhoneSmartAging project examining the global impact of new social media and how the rise of the smartphone is changing people's relationship to age and health.

The GutBCells project developed techniques to visualize the immune system and study the antibody immune response in the gut.