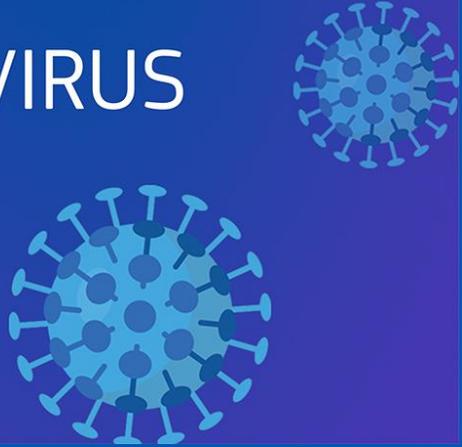




EU #CORONAVIRUS
RESPONSE



Research response of the European Commission to address the COVID-19 pandemic

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Research & Innovation DG
European Commission



Free Live WC11 webinars on
3Rs in COVID-19 research
25 and 26 August 2020 | 3 PM CET

>€1 billion H2020 Research actions for COVID-19

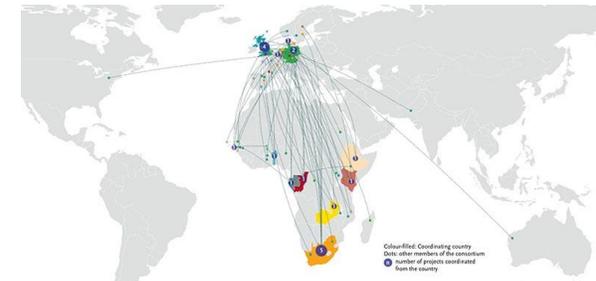
- 30 January 2020: 1st Expression of Interest 18 projects € 48M
 - epidemiology and public health (7p)
 - diagnostics (3p)
 - treatments (6p) antibodies, antivirals, solnatides
 - vaccines (2p) SARS-CoV-2 N DNA, VLP

- 3 March 2020: IMI fast-track call 8 projects € 72M (+€45M from industry)
 - Diagnostics (5p)
 - Treatments (3) antivirals, CT for TK inhibitor for ARDS

- 19 May 2020: 2nd Expression of Interest 23 projects €128M
 - Cohorts (2p)
 - Repurposing of manufacturing for vital medical supplies and equipment (4p)
 - Medical technologies, digital tools and AI to improve surveillance and care (13p)
 - Behavioural, social and economic impacts of the outbreak responses (4p)

>€1 billion H2020 Research actions for COVID-19 (2)

- 13 March 2020 EIC accelerator SME call: 36 projects €166M
 - Testing (3 p)
 - Treatment (22 p)
 - Prevention (5 p) vaccines, disinfectants and data analytics
 - Others (6 p) remote care to patients, QC of coronavirus-related products
- 3 April 2020 EDCTP call for R&I in sub-Saharan Africa: 20 projects € 25M
 - natural history of infection
 - point-of-care diagnostic tests
 - trials of promising products (diagnostics and therapeutics)
 - Validate serological tests and establish biobanks sera



>€1 billion H2020 Research actions for COVID-19 (3)

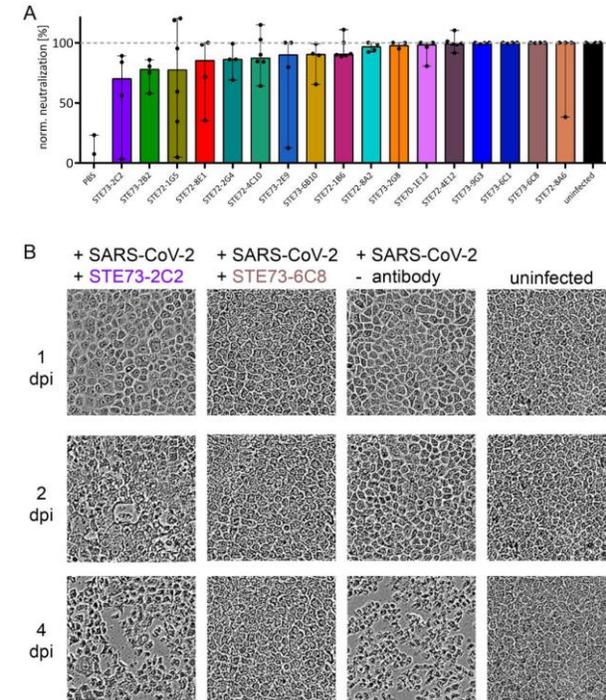
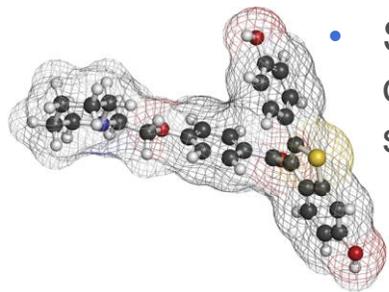
- Vaccines
 - CEPI to extend portfolio of vaccines and global manufacturing capacity €100M
 - Curevac for mRNA vaccine € 75M
- Clinical and public health response € 20M
 - Collect convalescent plasma
 - Extension of DisCoVery clinical trial
- Infrastructures € 15M
- EIT HEALTH 15 projects € 7M
 - biotechnology, diagnostics, digital health and med tech
- InnovFin Infection Disease Financial Facility €325M

Animals in H2020 COVID-19 projects

- >100 COVID-19 H2020 projects:
 - +/- €500M
- 10 H2020 COVID-19 projects with animal studies
 - <0.2% of budget to animal studies
- 3 H2020 COVID-19 related projects with Non-Human Primates (all treatments projects)
- 1 project with wild animals (bats and mice) to look into feces for presence of SARS-CoV-2 virus

Alternatives to animals in H2020 COVID-19 projects

- > 10% of projects use alternatives to animal studies
 - Quick results
- Examples:
 - Air-liquid cultures of human **airway** epithelia
 - Neutralizing antibodies generated with phage display technology
 - Generation of 17 human antibodies selected from pre-pandemic healthy donors binding at SARS-CoV-2 RBD-ACE2 interface
 - Suitable candidates for passive immunotherapy for treatment of COVID-19
 - Supercomputers, AI, and biological processing to screen millions of molecules
 - Screening of 400 000 molecules lead to the identification of Raloxifene (treatment of osteoporosis) as potential effective treatment for COVID-19 patients with mildly symptomatic infection

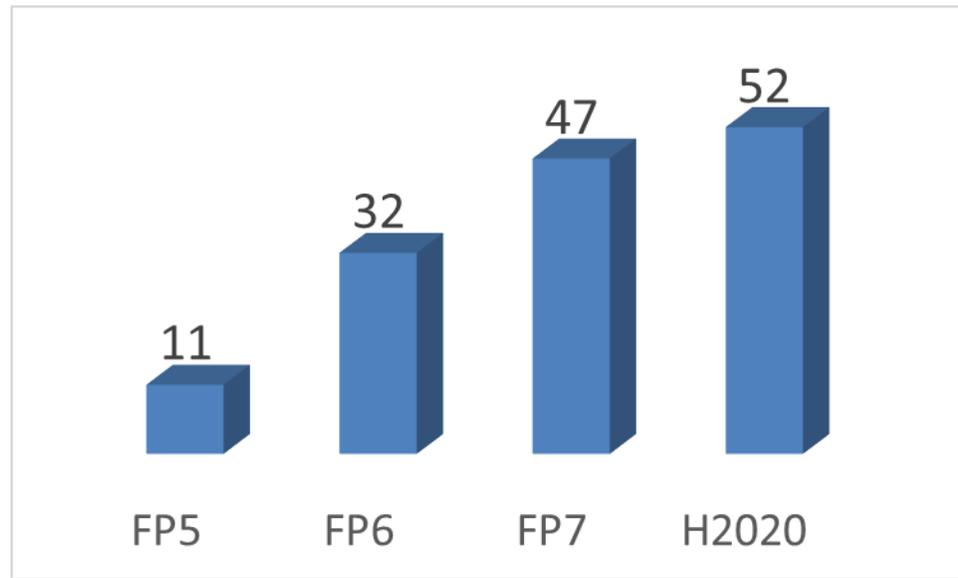


Bertoglio et al. bioRxiv 2020.06.05.135921

EU support the development of alternatives to animal testing

>200 projects
>€700M

Last 20 Years



Average Annual budget in €M

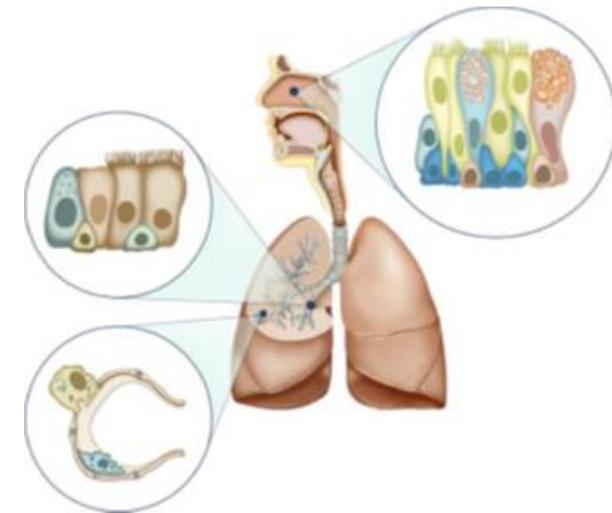
- Annual budget tripled from FP5 to FP6
- Annual budget increased by 50 % from FP6 to FP7
- Annual budget remained stable from FP7 to H2020
- Projects on cell systems, tissues- and organs-on-chips increased from FP5 to H2020 and represent now >20% of funding

H2020 projects on alternatives and COVID-19 research

- >75 H2020 projects: > €250M
- Survey to all coordinators (+/- 50% projects already closed) 30 replies
- 11 projects (35%) redirected activities towards COVID-19 research
- 17 projects (55%) contributed through their tools to COVID-19 research

H2020 projects on alternatives & COVID-19 research

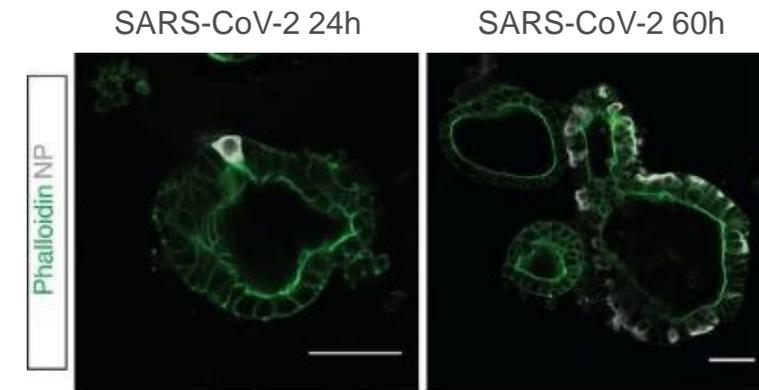
- Microfluidic devices with stem cell derived human **vascular endothelial** cells to model COVID-19 associated thrombus formation and immune cells to model SARS-CoV-2 induced **inflammation**
- Microphysiological systems that reproduce the minimal functional entity of the **brain**
- Air–liquid interface cultures of **nasal** epithelial cells for the study of SARS-CoV-2 pathogenesis, as it corroborates the expression of ACE2 in goblet/secretory cells and ciliated cells



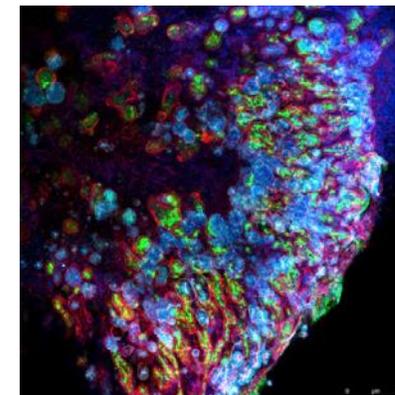
Nature Medicine 2020 May 26:681–687

Organoids in H2020 projects & COVID-19 research

- **Small intestinal** organoids
 - SARS-CoV-2 infected enterocytes produce infectious viral particles and trigger a viral response program
- **Liver** spheroids
 - effect of a JAKK inhibitor for treatment
- **Lung** organoids
- **Cardiac** organoids
 - examine cardiac damage
- **Kidney** organoids
 - infected by SARS-CoV-2 can be inhibited by hrsACE2



Science 2020 369: 50–54



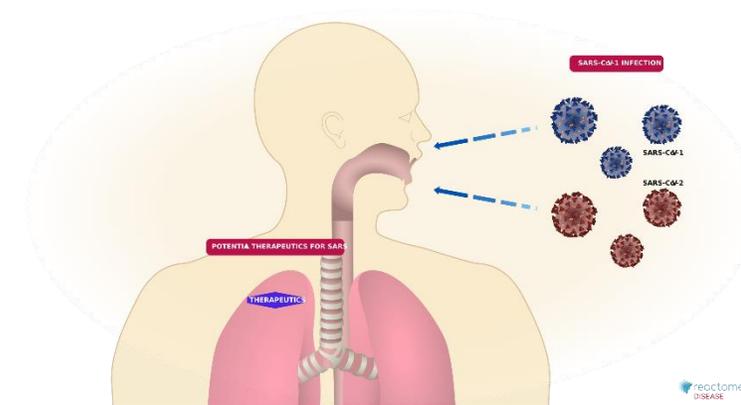
Cell. 2020 May 181:905-913

Other alternatives methods in H2020 projects & COVID-19 research

- Human primary **lung** cells
 - SARS-CoV-2 prevents burning carbohydrates, resulting in fat build-up inside lung cells, which the virus needs to reproduce. The cholesterol-lowering drug fenofibrate is currently tested
- iPS differentiated into **upper airway** for infection studies
- AOP linking **lung** toxicity to **lung** disease
- Bio coating of SARS-CoV-2 Spike protein for drug and siRNA screening
- Zebrafish larvae for **cardiotoxicity** of Hydroxychloroquine and other drugs
- Models for distribution of ACE2 in different human tissues and organs
- Mining of shared legacy data on drug safety profiles

Rapid data sharing and analysis: the European COVID-19 Data Platform

- **SARS-CoV-2 Data Hubs**
 - organize the flow of SARS-CoV-2 outbreak sequence data
- **Federated European Genome-phenome Archive**
 - secure controlled access sharing of sensitive patient and research subject data sets
- **COVID-19 Data Portal (www.covid19dataportal.org)**
 - **sequence data sharing and access to other SARS-CoV-2 resources**
 - Sequences from the virus and hosts (human, mice, NHPs)
 - Gene expression, Proteins, Biochemistry (pathways)
 - Literature > 140 000 papers



Effects of COVID-19 on use of test animals in the EU in 2020

- Were there more or fewer test animals used in 2020? Which species?
 - Annual stats on uses of animals for scientific purposes for year 2020 are provided by the Member States at the end of 2021
 - EU report should be ready by end of 2022
- Were there less animals bred and killed without being used for scientific purposes in 2020?
 - Member States are not required to record/report animals bred, killed and not used in 2020 or 2021
 - The data are mandatory only for 2022

Effect of COVID-19 on test animals beyond 2020

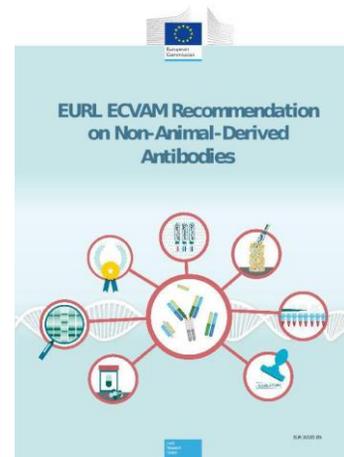
- Is this the opportunity to change the role of test animals in science?
 - Opinions differ between the scientific communities
 - For the “alternative” community => 20% in favor
 - For COVID-19 community => 0% in favor
 - Both communities are strongly against a ban on animal testing (98%)
 - The EC organizes a scientific conference “Towards replacement of animals for scientific purposes” in Brussels on 10-11 December 2020

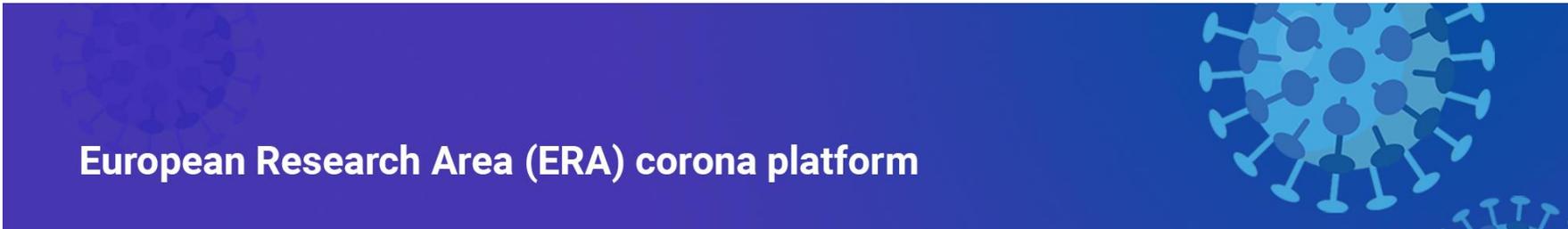


Preliminary conclusions

- EU is a major supporter of research in COVID-19 and “alternatives”
- Several H2020 projects have generated “alternative” tools that were immediately used in the COVID-19 research
- Some H2020 projects have built up a comprehensive set of methods for quickly testing the safety of new drugs, but the tools were not taken up by pharma
- “Alternatives” is not always understood the same way by all communities
- It is not always easy to identify COVID-19 research activities using “alternatives”
 - > 40 different therapeutic monoclonal antibodies under development, the majority of which from mice, but few (for GM-CSF) based on phage display

Need more cross-talks and better information on existing alternative methods





European Research Area (ERA) corona platform

Thank you
for your attention

More information

- EU-funded R&I on coronavirus:

<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/covid-19>



Let's meet at WC11 in 2021!

22-26 August 2021

MECC Maastricht



Questions?