European Commission

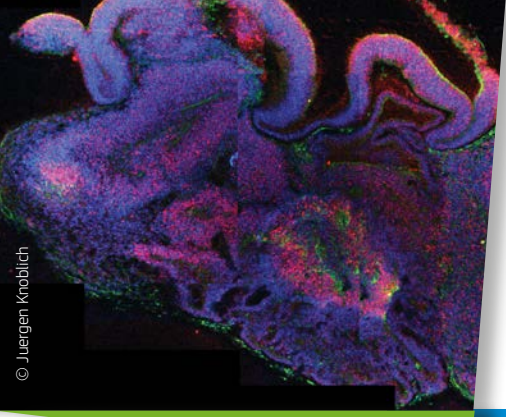
Organoids: mini organs in a dish for disease research and new cures

Producing miniature versions of organs in a dish may sound like science-fiction, but thanks to advances in stem cell technology and bioengineering scientists can now artificially grow a mass of cells into organoids with similar properties to organs. Organoids represent cells grown in specific three-dimensional (3D) environments, creating mini, simplified organs that retain some physiological function.

Following the observation that cells do not behave in 2D cultures as they do *in vivo*, 3D cultures of organoids have emerged as promising model systems for studying tissue development and generating new therapies. Recent technological breakthroughs have allowed 3D culture models to represent a more physiologically relevant approximation of the *in vivo* environment.

This CORDIS Results Pack presents the first exciting results for EU/ERC funded research from either the FP7 or Horizon 2020 programmes. It sheds light on five projects and their scientific advances in organoid technology and how they can be used as *in vivo*-like models.

ZZ-01-18-645-EN-N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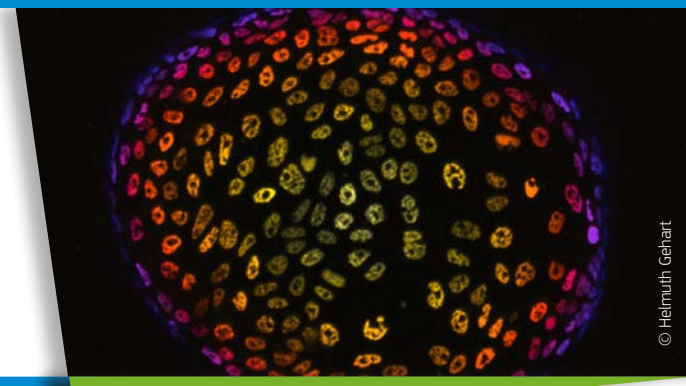
MINI BRAINS | (Cerebral organoids: human mini brains in a dish open up new possibilities for drug development in neurodegenerative and developmental diseases), based in Austria

Transferring results from animal models to humans is a major bottleneck in pharmaceutical research and this is especially true for brain disorders like neurogenerative and developmental diseases. The ERC funded project generated brain organoids to study the mechanisms of various neurological disorders and discover novel drugs to treat them.

TOXANOID | (Pharmacological safety testing in human adult stem cell-derived organoids), based in the Netherlands

Proving that their technology can outperform current *in vitro* systems and replace a significant portion of animal-based toxicology studies has enabled an EU-funded scientist and his team to develop organoid systems for several organs including the small intestine, colon and liver.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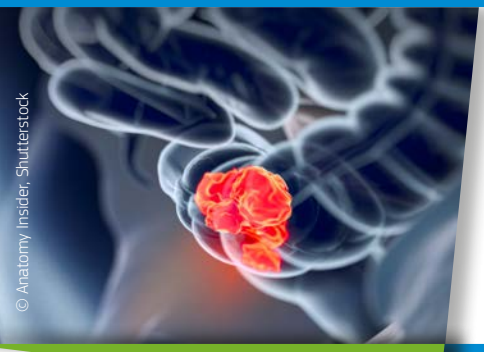
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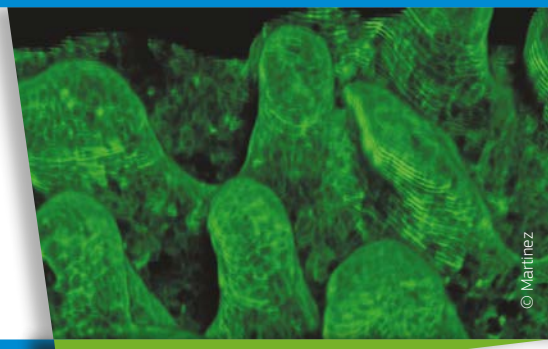
COLONCAN | (Targeting downstream effectors of Wnt signalling in colorectal cancer), based in the United Kingdom

Novel *ex vivo* three-dimensional organoid cultures that replicate genetic events in colorectal cancer (CRC), the second most common cause of cancer-related deaths, can now be used to test innovative new therapeutics.

COMIET | (Engineering Complex Intestinal Epithelial Tissue Models), based in Spain

Researchers have created a new cell culture platform for epithelial tissues, which advances the *in vitro* modelling of diseases, preclinical screening for drug efficacy and toxicity, as well as the understanding of organ development.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CLOC | (Cultured Liver Organoids for Investigation and Treatment of Inherited Cholestatic Diseases), based in the United Kingdom

This project has produced liver organoids *in vitro* using hepatocytes cultured on 3D scaffolds as novel models for studying liver development and disease, and the potential treatment of inherited cholestic disorders.

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European Research Council
Established by the European Commission

ISBN: 978-92-78-41785-7
doi:10.2830/201088