

Things are only impossible until they're not



Welcome to the very first issue of *Nature Reviews Bioengineering*, a new *Nature Reviews* journal covering all areas of bioengineering, with a particular focus on translation, inclusivity and accessibility.

Engineering is the science of problem solving, making 'impossible' ideas possible in the real world. Bioengineers have enabled the design of life-saving concepts, such as artificial organs, pacemakers, vaccines, medical robots and point-of-care diagnostic tests, to only name a few. Bioengineering also plays a key role in tackling one of the most critical global issues of our times – climate change; for example, by providing new solutions to cellular agriculture, or by [improving the sustainability of industrial bioprocesses](#).

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Such breadth and impact can be glimpsed by the range of topics we cover in our first issue; for example, lateral flow tests, which rose to fame in the form of home pregnancy tests, have proved a crucial countermeasure to the spread of COVID-19 and may provide a key technology in improving global health, for example, for decentralized testing of antimicrobial resistance. In this issue, [Rachel McKendry and colleagues](#) discuss the lessons learned from COVID-19 for the design of

next-generation lateral-flow tests. Similarly, lipid nanoparticle–mRNA vaccines showcase the incredible value of bioengineering in addressing key societal needs, and bioengineers are already optimizing nanoscale tools for the targeted delivery of nucleic acid therapeutics, [as highlighted in this issue](#). Beyond nanoparticles, bioengineers are also exploring [biohybrid microrobots](#) that combine cellular and synthetic components for drug delivery.

Bioengineered human-relevant in vitro models, such as organs-on-chips and organoids, have changed the way we conduct fundamental biology and preclinical studies. In this issue, [Hans Clevers and Maarten Geurts](#) discuss the design of isogenic organoid-based disease models using CRISPR-mediated genome engineering, showcasing how CRISPR tools in organoids can bring genome engineering one step closer to patients.

[Michael Levin and Jamie Davies](#) examine the transition from cell-level synthetic biology to multicellular synthetic morphology, investigating experimental embryology studies, including organoids and xenobots, that go beyond default outcomes of embryogenesis. This agential bioengineering approach could transform regenerative medicine and robotics, and such in vitro platforms may well bridge the gap between preclinical animal studies and clinical trials.

On a more technical note, the design of in vivo imaging probes has already transformed clinical practice. In particular, in vivo imaging is turning into a powerful tool for diagnostics and image-guided surgery. In this issue, [Fan Zhang and team](#) highlight important engineering challenges that remain to be

addressed to promote the clinical translation of near-infrared luminescence high-contrast biomedical imaging.

We also want to discuss translational pathways for bioengineering research. In a Down to Business article in this issue, [Roozbeh Ghaffari and colleagues](#) tell the story of the wearable sweat-sensing platform Gx Sweat Patch, from development to regulatory approval and the challenges of commercial launch. We hope that our Down to Business articles will provide a useful resource for bioengineers interested in translating their research.

Importantly, we would also like to highlight the application of bioengineered systems in low-resource settings. After all, we want our field to have global impact, and thus, we need to consider various environments and settings. In a [Viewpoint in this issue](#), researchers and global health experts discuss the impact of bioengineering on global health, and in a Comment, [Tojan Rahhal and Rachel Goforth](#) introduce Engineering World Health – a non-profit organization aiming at inspiring and educating the bioengineering community to improve global health-care delivery.

We are delighted that our first issue is out, and we want to particularly thank our authors and referees, who have provided excellent, critical and thought-provoking articles and comments.

Bioengineering can positively impact global health, the environment and our society. Our hope is to be part of this journey, and we look forward to providing a trusted platform for discussion, debate and solution. We hope you all enjoy reading our pages.

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