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## **Introducing Emerging Methods and Technologies**

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### **Abstract**

With the current issue of *The FEBS Journal*, we are introducing a new category of invited review article contributions on Emerging Methods and Technologies. These articles provide an overview and discussion of recent, emerging methods that significantly advance and improve research efforts in the different fields of molecular and cellular research of our *The FEBS Journal* authors and readers. Deputy Editorial Manager Manuel Breuer and our Emerging Methods and Technologies commissioning editor Eric Chevet introduce the series.

Technological advances have consistently shaped modern cell and molecular biology, from the early days to leading-edge methods of the 21<sup>st</sup> century. Breakthroughs in gene silencing, protein analysis and/or -labelling-techniques, enzymology, stem cells, embryology, parasitology, advanced microscopy and cancer therapy have been lauded by the community and the broad public, being awarded prestigious accolades. The past decade has seen a further acceleration in the refinement and improvement of molecular techniques, which, despite their seemingly complex setups in some cases, have become standard approaches to gain a mechanistic understanding of the cell and its molecular pathways. Prominent examples are the rise of CRISPR/Cas9-based gene editing techniques and the single-cell revolution, allowing for data collection on and of individual cell types in complex, developmental and (patho)-physiological contexts. These major achievements were enabled through the continuous improvement and fine-tuning of evolved genome-wide genetic screens (e.g. CRISPR), single-cell RNA-sequencing and proteomic approaches. Such -omics-labelled approaches went hand in hand with the advent of cutting-edge light and electron microscopy in the last years, establishing cryo-EM and super-resolution microscopy in the portfolio of molecular and cellular research.

Away from breakthrough events in technologies that pushed research efforts forward at once, many of the methods above rely on the continuous improvement of established techniques, however. Thus, it is in the constant refinement and adaptation of a method for and by the different communities that progress is being made in answering the key questions of each research domain. Here, at *The FEBS Journal*, we therefore feel that technology- and method-focused review articles merit their own category, alongside our many other review-type articles. Approaches that significantly advance research efforts in molecular and cellular research are discussed in our Emerging Methods & Technologies contributions. Here, we introduce some of the most recent articles of this kind.

Jian Xe and Daniel DiMaio report a screening strategy that relies on artificial transmembrane proteins, which localize in cells and perturb cellular pathways, yielding a desired phenotype. These so-called traptamer libraries can be used to identify new proteins or protein-protein interactions in cellular

processes and the authors show how select traptamers can inhibit the human papillomavirus (HPV) pathway and identify the Rab GAP TBC1D5 as a factor needed for endosome exit during HPV entry [1].

Barbara Richichi, Sandra van Vliet and colleagues focus on glycans and the emerging field of glycan-based tools such as nanoparticles that can be used in cancer immunotherapy and the suppression of an immune response in auto-immune diseases [2]. Personalized cancer treatment relies more and more on systems biology and the informed use of modelling and machine learning approaches in combination with a data-driven angle such as -omics-based experiments and drug treatment. The review by Mariko Okada and colleagues [3] takes a look at modeling approaches and advances in systems biology with the aim of linking gene alterations to clinical outcomes, with a specific focus on receptor tyrosine kinase (RTK) signaling pathways.

Antonio del Sol and colleagues highlight a computational tool, 'NicheHotSpotter', which was instrumental in the discovery of a sub-population of skeletal muscle stem cells with distinct, genuine stemness properties that are maintained through adult life and only deteriorate in geriatric age [4]. NicheHotSpotter acts thereby as a tool that integrates gene expression data and data from the signalling interactome to identify key factors that might be required to sustain niche-induced signals to stem cells. The tool could also be used more generally for the interrogation of stem cell renewal and stem cell niche cell populations [5].

From computational methods to the etiology of Alzheimer's disease: the production of excessive amounts of reactive oxygen species (ROS) and the resulting increased oxidative stress have been linked to the development and progression of neurodegenerative diseases. In their review, Chantal Galaup, Fabrice Collin and colleagues highlight the emergence of molecular luminescent probes that are based on lanthanide complexes, which serve as ROS sensors *in vitro* and *in vivo*. They discuss the advantages of these highly sensitive probes over traditional organic fluorophores [6]. The overview article by Loredano Pollegioni and co-workers looks at the advances in methods related to the degradation of poly(ethylene terephthalate), or PET, which is a major concern for the pollution of ecosystems [7]. The authors highlight the most suitable PET-hydrolyzing enzymes, discuss enzyme kinetics and lay out the analytical methods required for the most informed screening of new naturally occurring and synthetic PET hydrolytic enzymes.

We believe you will enjoy reading this selection of articles from our newest review category in *The FEBS Journal* and we hope that you will check back regularly for similar content.

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