

Editorial

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Julia Gross and Gregor Fuhrmann

Extracellular vesicles – all back to normal?

Meet the researcher

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A few questions to Prof. Dr. Dave Carter, Evox and Oxford Brookes

Dave Carter graduated from York University with a BSc in Biochemistry, which included a year working on the human genome project at the Sanger Institute in Cambridge. He completed his PhD at Cambridge University with the project 'RNA-tagging and recovery of associated proteins'. After a postdoc at Oxford University, Dave was appointed as Lecturer and Professor in Biomedical Science at Oxford Brookes University. Here he established a lab to study the effects of non-coding RNAs and extracellular vesicles in stress response. In 2021, Dave took up a position as Research Director at Evox Therapeutics Ltd, an Oxford-based biotechnology company who are developing extracellular vesicles as therapeutic delivery vehicles for a range of rare diseases.

Research article

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Dapi Menglin Chiang, Laura Benecke, Chen Meng, Christina Ludwig, Laurent Muller and Michael W. Pfaffl

Proteomic profiling of extracellular vesicles suggests Collectin10 as potential biomarker in relapsing head and neck squamous cell carcinoma

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Head and neck squamous cell carcinoma (HNSCC) is the 6th most common cancer worldwide. Developing new therapies has been ongoing for many decades, however, the 5-year overall survival rate remains comparably low and has not improved significantly. Treatment failure in HNSCC patients is common, especially in recurrences, and results in a poorer prognosis. Therefore, a better understanding of the disease is crucial to detect HNSCC recurrences at an early stage. HNSCC-associated extracellular vesicles (EVs), have been shown to suppress the immune system and thereby promote tumor progression.

Dolma Choezom and Julia Christina Gross

Characterization of two novel neutral sphingomyelinase 2 inhibitors in endosomal sorting and extracellular vesicle biogenesis

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Sphingomyelinase hydrolyzes the phosphodiester bond of the sphingomyelin to ceramide and phosphorylcholine and have been involved in extracellular vesicle (EV) biogenesis and more recently in membrane repair. Here we describe an initial testing of two recently discovered neutral sphingomyelinase 2 (nSMase2) inhibitors ((R)-1-(3-(3,4-dimethoxyphenyl)-2,6-dimethylimidazo[1,2-b]pyridazin-8-yl)pyrrolidin-3-yl)-carbamate (PDDC) and 2,6-dimethoxy-4-[4-phenyl-5-(2-thienyl)-1H-imidazol-2-yl]phenol (DPTIP)).

Method contribution

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Federico Bleckwedel, Giulia Germena, Rabea Hinkel and Laura C. Zelarayán

An optimized protocol for the enrichment of small vesicles from murine and non-human primate heart tissue

Over the last few years, the interest in extracellular vesicles (EVs) function has exponentially grown. However, methods for isolating these small vesicles from tissue are still not trivial. Few protocols that allow EV isolation from whole tissue samples, including the heart, are available and they are based on organ perfusion using Langendorff method. In this work, aiming at analysing in vivo biology of small EVs, we implemented a simple method to obtain enrichment of these vesicles from murine heart tissue.

Minireview

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Phillipp Brockmeyer and Bernhard Hemmerlein

Mast cell-tumor cell interactions via extracellular vesicles 34

Mast cells (MCs) are effector cells of the immune system playing a crucial role in numerous physiological and pathological conditions. MCs are also known to be involved in the progression of various malignoma. Tumor-promoting and tumor-inhibiting effects have been described. However, the exact MC/tumor cell interaction pathways are far from clear. In this mini view, the MCs' roles were outlined during tumor progression, and the literature on extracellular vesicles (EVs) was reviewed as a possible communication pathway.

Marko Morávek, Ján Rosocha and Tímea Špaková

Synovial fluid-derived extracellular vesicles - potential biomarkers of osteoarthritis 39

Osteoarthritis (OA) is a degenerative disease of the musculoskeletal system affecting millions of people around the world. Therefore, research focusing on the correct diagnostics and effective treatment of OA represents a major society-wide challenge. Extracellular vesicles (EVs) as extracellular products of cells containing nucleic acids, proteins and lipids provide intercellular communication and affect the biological activity of cells. This work describes the pathogenesis of OA and the current nomenclature, composition and potential function of EVs associated with this degenerative disease. Investigation of EVs function in OA will help to elucidate the pathogenesis and investigate other new potential biomarkers of this disease.

EVs in Parkinson's

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Alexander Weiß, Andreu Matamoros-Angles, Fanni Annamária Boros, Philipp Arnold and Friederike Zunke

Extracellular vesicles – upcoming biomarkers in Parkinson's disease's biofluids

The search of a biomarker for an early detection of neurodegenerative diseases is one of the biggest challenges of our times. The second most common neurodegenerative disorder Parkinson's disease (PD) is characterized by misfolded alpha-synuclein (a-syn) aggregates within the central nervous system (CNS). Currently, definitive PD diagnosis still requires post-mortem brain examination.

EVs and cilia

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Christoph Gerhardt and Thorsten Pfirrmann

Extracellular vesicles in ciliary signalling

Primary cilia are tiny cellular protrusions deeply involved in intercellular communication. Initially misjudged as a rudiment of motile cilia, it turned out that the primary cilium functions as the cell's antenna mediating signals which are indispensable for proper human development and homeostasis. Ciliary dysfunction results in severe human diseases collectively referred to as ciliopathies. Originally, ciliopathies were considered to be rare diseases, but the number of diseases identified as or assumed to be ciliopathies is permanently rising. Even common diseases such as cancer or neurodegenerative diseases are considered to be associated with primary cilia.