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Gregor Fuhrmann

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Bernd Giebel

Extracellular vesicles as gold mine for new diagnostic and therapeutic approaches in medicine 10

Stefan Holdenrieder

Extracellular vesicles (EVs) are a heterogeneous group of subcellular particles shed from the cells of origin by diverse mechanisms. They carry specific information and are responsible for efficient intercellular communication that is highly important for the pathogenesis and progression of many diseases. Their unique properties offer the opportunity to use them also for the delivery of therapeutic drugs.

Isolation and characterization of extracellular vesicles 18

Fabia Fricke, Dominik Buschmann and Michael W. Pfaffl

Since EVs are secreted by most, if not all, eukaryotic and prokaryotic cells, they have been detected in body fluids as diverse as blood, urine and saliva as well as in cell culture media. This manuscript gives an overview of EV isolation and characterization strategies and highlights their advantages and disadvantages

Tumor cell communication through EVs: new challenges and opportunities 27

Cecile L. Maire and Franz L. Ricklefs

EVs are contributing to the interaction of tumor cells with the microenvironment and promoting tumor growth. Furthermore, they have gained substantial interest due to their potential utility for liquid biopsy approaches in cancer.

Extracellular vesicles – developmental messengers of tissue crosstalk 31

Leonie Witte and Julia Christina Gross

During development, EV secretion and the specific loading of signalling factors in EVs contributes to organ development and tissue differentiation. Different biomolecules such as proteins, lipids and nucleic acids transmit these signals and the content, size, and membrane composition of EVs are highly dynamic and depend on the cellular source, state, and environmental conditions.

From mesenchymal stem cells and stromal cells
From bench to bedside 36

Bernd Giebel, Verena Börger, Mario Gimona and Eva Rohde

Human mesenchymal stem/stromal cells (MSCs) represent a promising tool in regenerative medicine. Until now, almost one thousand NIH-registered clinical trials investigated their immunomodulatory and pro-regenerative therapeutic potential in various diseases. Despite controversial reports regarding the efficacy of MSC-treatments, MSCs appear to exert their beneficial effects in a paracrine manner rather than by cell replacement.

Analysis of extracellular vesicles by flow cytometry – basics, limitations and prospects 40

Andreas Spittler and André Görgens

Flow cytometry is a well-established technique that is classically used to detect cells and quantify related parameters on the cellular surface, e. g. the expression of surface protein markers. Within the last few years, there also have been considerable advances of using flow cytometry to detect and quantify extracellular vesicles.

Extracellular vesicles in plant host-microbe interaction 46

Constance Tisserant and Arne Weiberg

Recent pioneering works resulted in novel concepts that place EVs carrying regulatory small RNAs as central players in inter-species and cross-kingdom communication with emphasis on host-pathogen, host-parasite and host-microbiome interactions.