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RESEARCH AREA

Extracellular Vesicles (EVs) are recognised as key intercellular messengers contributing to most if not all health and disease processes. However, there is little to no information on the respective contributions of DNA, RNA, or protein cargoes to the observed phenotypes transferred by EVs. Critically, studies show EV transfer of DNA, RNA, or protein, yet the primary molecule(s) mediating the EV effect remain unclear. Understanding EV uptake and intracellular trafficking is also crucial, as the effect of proteins may be mediated by interaction with the plasma membrane, but DNA or RNA require transport to the nucleus or cytoplasm.

Our team studies these essential mechanistic questions using EV, CRISPR, and synthetic biology tools to control the cargo loaded into EVs. In addition to elucidating these fundamental questions, our team is developing the next generation of gene and cell therapy delivery vectors using engineered EVs and viruses that show great promise in overcoming immunogenicity, safety, and efficacy challenges presented by conventional delivery vectors.

TECHNIQUES AVAILABLE IN THE LAB

EV isolation and characterization, nanoparticle tracking analysis, tuneable resistive pulse sensing, flow cytometry and fluorescence-based cell sorting, western blot, ELISA, confocal and super-resolution microscopy, PCR, molecular biology, viral production (AAV and LV), cell engineering, synthetic biology.

SELECTED PUBLICATIONS

Osteikoetxea. X., Silva, A., Lázaro-Ibáñez, E., Salmond, N., Shatnyeva, O., Stein, J., Schick, J., Wren, S., Lindgren, J., Firth, M., Madsen, A., Mayr, L. M., Overman, R., Davies, R., Dekker, N. (2022) Engineered Cas9 extracellular vesicles as a novel gene editing tool. **J Extracell Vesicles 11:** e12225.

Kestecher, B. M., Németh, K., Ghosal, S., Sayour, N. V., Gergely, T. G., Bodnár, B. R., Försönits, A. I., Sódar, W. B., Oesterreicher, J., Holnthoner, W., Varga, Z. V., Giricz, Z., Ferdinandy, P., Buzás, E. I., **Osteikoetxea, X.** (2024) Reduced circulating CD63+ extracellular vesicle levels associate with atherosclerosis in hypercholesterolaemic mice and humans. **Cardiovasc Diabetol 23:** 368.

Heath, N., **Osteikoetxea, X.**, de Oliveria, T. M., Lázaro-Ibáñez, E., Shatnyeva, O., Schindler, C., Tigue, N., Mayr, L. M., Dekker, N., Overman, R., Davies, R. (2019) Endosomal escape enhancing compounds facilitate functional delivery of extracellular vesicle cargo. **Nanomedicine (Lond) 21:** 2799-2814.

Osteikoetxea, X., Balogh, A., Szabó-Taylor, K., Németh, A., Szabó, T. G., Pálóczi, K., Sódar, B., Kittel, Á., György, B., Pállinger, É., Matkó, J., Buzás, E. I. (2015) Improved characterization of EV preparations based on protein to lipid ratio and lipid properties. **PLoS One 10:** e0121184.

Osteikoetxea, X., Sódar, B., Németh, A., Szabó-Taylor, K., Pálóczi, K., Vukman, K. V., Tamási, V., Balogh, A., Kittel, Á., Pállinger, É., Buzás, E. I. (2015) Differential detergent sensitivity of extracellular vesicle subpopulations. **Org Biomol Chem 13:** 9775-82.