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TITLE OF HIS PRESENTATION

Vascular calcification – what the clinician sees and does

RESULTS FOR THE TALENTUM PRIZE 2024 NOMINATION

Exploring the relationship between tissue mineralization and iron metabolism, as well as hydrogen sulfide, thereby identifying new regulatory hubs and directions for drug development.

RESEARCH AREA

The main research focus of the Vascular Biology Research Group is the investigation of the pathological molecular mechanisms underlying the remodeling/calcification of blood vessels and heart valves. To this end, we perform cell type-specific functional and morphological studies via employing human tissue samples, mouse animal models, and by utilizing isolated cell cultures we study the behavior of isolated cells. Specific aim is to explore the pathological cell transformation processes and the adaptive cellular responses for designating therapeutic targets.

TECHNIQUES AVAILABLE IN THE LAB

Processing of samples derived from human and animal models of vascular diseases, learning about genetically modified animal models, isolation and culture of various vascular cells from human and mice tissue samples, gene silencing methods, immunohistochemistry and immunofluorescence staining, nuclear and cytoplasmic protein extraction, Western blot, LC-MS/MS analysis, enzyme activity methods, quantitative real-time polymerase chain reaction, RNA-sequencing and data analysis, light microscopy, confocal and super-resolution microscopy

SELECTED PUBLICATIONS

Hydrogen sulfide as an anti-calcification stratagem in human aortic valve: Altered biogenesis and mitochondrial metabolism of H2S lead to H2S deficiency in calcific aortic valve disease. Combi Z, Potor L, Nagy P, Sikura KÉ, Ditrói T, Jurányi EP, Galambos K, Szerafin T, Gergely P, Whiteman M, Torregrossa R, Ding Y, Beke L, Hendrik Z, Méhes G, Balla G, **Balla J. Redox Biol.** 2023 Apr;60:102629

Overview on hydrogen sulfide-mediated suppression of vascular calcification and hemoglobin/heme-mediated vascular damage in atherosclerosis. Gáll T, Nagy P, Garai D, Potor L, Balla GJ, Balla G, **Balla J. Redox Biol.** 2022 Nov;57:102504

Oxidation of Hemoglobin Drives a Proatherogenic Polarization of Macrophages in Human Atherosclerosis. Potor L, Hendrik Z, Patsalos A, Katona É, Méhes G, Póliska S, Csősz É, Kalló G, Komáromi I, Combi Z, Posta N, Sikura KÉ, Pethő D, Oros M, Vereb G, Tóth C, Gergely P, Nagy L, Balla G, **Balla J. Antioxid Redox Signal.** 2021 Oct 20;35(12):917-950

Hemoglobin oxidation generates globin-derived peptides in atherosclerotic lesions and intraventricular hemorrhage of the brain, provoking endothelial dysfunction. Posta N, Csősz É, Oros M, Pethő D, Potor L, Kalló G, Hendrik Z, Sikura KÉ, Méhes G, Tóth C, Posta J, Balla G, **Balla J. Lab Invest.** 2020 Jul;100(7):986-1002

Hydrogen sulfide inhibits aortic valve calcification in heart via regulating RUNX2 by NF-κB, a link between inflammation and mineralization. Éva Sikura K, Combi Z, Potor L, Szerafin T, Hendrik Z, Méhes G, Gergely P, Whiteman M, Beke L, Fürtös I, Balla G, **Balla J. J Adv Res.** 2020 Jul 21;27:165-176