

“Artificial oxygen carriers on perfluorocarbon base; concept and applications”

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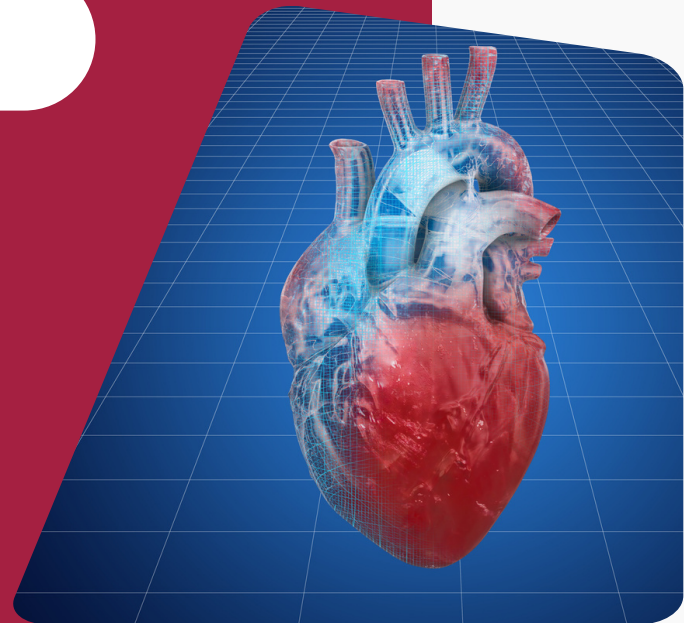
Thursday, October 22, 2026



5 pm



H810, Murtenstrasse 35, Bern



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“Artificial oxygen carriers on perfluorocarbon base; concept and applications”

Prof. Dr. Katja Siebecke, University Duisburg-Essen, Germany

Abstract:

Due to their immediate availability, blood group independence, high oxygen transfer capacity, long shelf life, and durability, perfluorocarbon-based artificial oxygen carriers are an attractive alternative to red blood cell (RBC) concentrates for various applications, including extracorporeal machine perfusion of donor organs or RBC replacement. Because of the cavities between the individual molecules, perfluorocarbons exhibit a higher solubility for respiratory gases than water and other aqueous media. Therefore, they can support or take over oxygen transport in the blood, either instead of or together with RBCs. This has already been demonstrated by us and others in isolated perfused organs and in vivo, in both preclinical settings and clinical trials¹. Perfluorocarbons are lipo- and hydrophobic molecules of exceptional chemical stability and physiological inertness. No toxic metabolites are formed in the body or tissue, and excess perfluorocarbon is simply exhaled by the lungs due to its high vapor pressure. However, using them in aqueous media, such as plasma, blood, cell culture medium or organ perfusates requires emulsification or encapsulation². We emulsify perfluorocarbons with natural, biocompatible emulsifiers and can provide an artificial oxygen carrier compatible with various cell culture media, organ perfusate solutions, clinical volume substitution solutions and blood^{2,3}. This talk will introduce you to the unique properties of perfluorocarbon-based artificial oxygen carriers and will show applications ranging from cell culture e.g. HL-1 via machine perfusion of e.g. rat/pig hearts towards whole animal models.

1) N. Mohanto, H. Mondal, Y.J. Park et al. Therapeutic delivery of oxygen using artificial oxygen carriers demonstrates the possibility of treating a wide range of diseases. (2025) J Nanobiotechnol 23, 25

2) J. Jägers, A. Wrobeln and K.B. Ferenz, Perfluorocarbon based oxygen carriers: From Physics to Physiology (2020). Pflügers Arch. 473(2): 139-150

3) F. Nocke, M.A. Schroer, M. Penzel, M. Cantore, A.U. Steinbicker, K.B. Ferenz. Lecithin-Modified Nanoscale Oxygen Carriers (LENOX): New Designed Perfluorocarbon- Based Artificial Oxygen Carriers Ready-to-Use in Clinically Relevant Media. (2025) Adv. NanoBiomed Res. 2025, 2500117.

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