

**Prof. Dr. Katja Ferenz**Institut für Physiologie,  
Universität Duisburg-Essen**Applications of Albumin-derived  
Perfluorocarbon-based Artificial  
Oxygen carriers**

Allogenic erythrocyte transfusions represent a life–securing intervention in modern medicine. However, the availability of erythrocyte concentrates (RBCs) is limited and they are discussed critically because of potential infection risks and immunomodulation phenomena. The implementation of restrictive transfusion triggers as well as of more global measures called “patient blood management” are still not sufficient to resolve the shortage of RBCs, caused by the demographic change and the co-occurring declining willingness for blood donation of the population.

However, efficient supply of molecular oxygen to the tissue with a simultaneous removal of carbon dioxide from the organism is impaired not only in anemic or hemorrhagic patients but also at blood shortage scenarios. In such situations, artificial oxygen carriers (AOCs) dispersed in plasma-like media would be an urgently awaited alternative to RBCs. Most importantly, RBCs change their physico-chemical qualities during storage while until today the consequences of those changes on patients as well as the optimal parameters of storage of RBCs are still not defined unanimously.

Although AOCs are available in a couple of countries such as Russia, Ukraine, Mexico, Kyrgyzstan and Kazakhstan (Perftoran®, perfluorocarbon-based) as well as South Africa and Russia (Hemopure®, hemoglobin-based), authorities in Europe, Japan or USA still reject those drugs because of unbalanced risk-benefit analysis. However, the use of perfluorocarbon-based AOCs is particularly attractive as perfluorocarbons (elsewise than hemoglobin-based drugs) may be used not only to bridge blood loss but also for therapy of decompression sickness and smoke poisonings as they remain functional even in the presence of flue gases, e.g. carbon monoxide. For intravenous use, perfluorocarbons must be processed to become compatible with the aqueous medium blood.

In my group we design perfluorocarbon-based AOCs by encapsulating perfluorocarbons with different shell materials. We perform *in vitro* characterization and *in vivo* evaluation of those artificial oxygen carriers to prove their feasibility for intravenous administration.

Actual research projects are

- i. Perfluorocarbon-based AOCs as blood substitutes
- ii. Perfluorocarbon-based AOCs to improve quality of organs prior to transplantation
- iii. Treatment of decompression sickness with perfluorocarbon-based AOC

**Time:** Monday 9th March 2020, 17:15h  
**Location:** Raum VKL 4.1.29  
Institut für Physiologie  
Universität Regensburg

**The seminar is video transmitted to:**  
Pathologie Universitätsklinikum Erlangen  
Krankenhausstr. 8-10  
Oberer Hörsaal, Raum A 2.150