Effect of extracorporeal circulation on structure of main components of animal plasma – ATR-IR and 2D-COS studies: Part I

Autorzy

Sylwia Olsztyńska-Janus

Mirosław Antoni Czarnecki

Rok wydania

2025

Czasopismo

Spectrochimica Acta Part A-Molecular and Biomolecular Spectroscopy

Numer woluminu

335

Strony

125984/1-125984/11

DOI

10.1016/j.saa.2025.125984

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

Every year, more and more adults and children with severe cardiac and/or respiratory failure require connection to extracorporeal circulation (ECC). Despite a life-saving role in emergency settings, the use of ECC is associated with several serious complications, which result from structural changes in the plasma components. As yet, the molecular mechanism of these changes was not well recognized, and therefore we undertook the first spectroscopic study of structural changes in plasma during ECC. Vibrational spectroscopy coupled with two-dimensional correlation spectroscopy (2D-COS) is a powerful tool for elucidation of variations at a molecular level. The spectra of animal plasma were recorded by ATR-IR (Attenuated Total Reflection-Infrared) technique, which enables measurements of strongly absorbing samples in a non-destructive way. Moving-window and 2D-COS methods were used to obtain more detailed information about the correlation between spectral features and vibrations of functional groups. A comprehensive analysis of variations in the main plasma components requires using bands from both polar (—NH, —OH, —CO, and C=O) and non-polar groups (aliphatic and aromatic moieties). Of particular interest is the effect of the state of water on the structure and intermolecular interactions of the plasma under ECC.

Słowa kluczowe

Extracorporeal circulation, Plasma, Proteins, Lipids, ATR-IR spectroscopy, hydrogen bonding, Two-dimensional correlation spectroscopy

Adres publiczny

http://dx.doi.org/10.1016/j.saa.2025.125984

Strona internetowa wydawcy

http://www.elsevier.com