

Accepted Manuscript

Characterization of extracellular vesicles by IR spectroscopy: Fast and simple classification based on amide and C-H stretching vibrations

Judith Mihály, Róbert Deák, Imola Csilla Szigyártó, Attila Bóta, Tamás Beke-Somfai, Zoltán Varga

PII: S0005-2736(16)30390-X
DOI: doi:[10.1016/j.bbamem.2016.12.005](https://doi.org/10.1016/j.bbamem.2016.12.005)
Reference: BBAMEM 82368

To appear in: *BBA - Biomembranes*

Received date: 1 February 2016
Revised date: 29 November 2016
Accepted date: 14 December 2016

Please cite this article as: Judith Mihály, Róbert Deák, Imola Csilla Szigyártó, Attila Bóta, Tamás Beke-Somfai, Zoltán Varga, Characterization of extracellular vesicles by IR spectroscopy: Fast and simple classification based on amide and C-H stretching vibrations, *BBA - Biomembranes* (2016), doi:[10.1016/j.bbamem.2016.12.005](https://doi.org/10.1016/j.bbamem.2016.12.005)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Characterization of extracellular vesicles by IR spectroscopy: fast and simple classification based on amide and C-H stretching vibrations

Judith Mihály*, Róbert Deák, Imola Csilla Szigyártó, Attila Bóta, Tamás Beke-Somfai, Zoltán Varga

Institute of Materials and Environmental Chemistry, Research Centre for Natural Sciences of the Hungarian Academy of Sciences, 1117 Budapest, Magyar tudósok körútja 2, Hungary

*Corresponding author.

E-mail address: mihaly.judith@ttk.mta.hu

Abstract

Extracellular vesicles isolated by differential centrifugation from Jurkat T-cell line were investigated by attenuated total reflection Fourier-transform infrared spectroscopy (ATR-FTIR). Amide and C-H stretching band intensity ratios calculated from IR bands, characteristic of protein and lipid components, proved to be distinctive for the different extracellular vesicle subpopulations. This proposed 'spectroscopic protein-to-lipid ratio', combined with the outlined spectrum-analysis protocol is valid also for low sample concentrations (0.15-0.05 mg/ml total protein content) and can carry information about the presence of other non-vesicular formations such as aggregated proteins, lipoproteins and immune complexes. Detailed analysis of IR data reveals compositional changes of extracellular vesicles subpopulations: second derivative spectra suggest changes in protein composition from parent cell towards exosomes favoring proteins with β -turns and unordered motifs at the expense of intermolecular β -sheet structures. The IR-based protein-to-lipid assessment protocol was tested also for red blood cell derived microvesicles for which similar values were obtained. The potential applicability of this technique for fast and efficient characterization of vesicular components is high as the investigated samples require no further preparations and all the different molecular species can be determined in the same sample. The results indicate that ATR-FTIR measurements provide a simple and reproducible method for the screening of extracellular vesicle preparations. It is hoped that this sophisticated technique will have further impact in extracellular vesicle research.

Keywords: *exosome; microvesicle; extracellular vesicles; ATR-FTIR spectroscopy; spectroscopic protein-to-lipid ratio; erythrocyte ghost membrane*

Download English Version:

<https://daneshyari.com/en/article/5507356>

Download Persian Version:

<https://daneshyari.com/article/5507356>

[Daneshyari.com](https://daneshyari.com)