

Glycosaminoglycans Profiling in Different Cell Types Using Infrared Spectroscopy and Imaging.

Brezillon, S., Untereiner, V., Lovergne, L., Tadeo, I., Noguera, R., Maquart, F.X., Wegrowski, Y., Sockalingum, G.D.

Anal. Bional. Chem., 406:5795-5803, 2014

Abstract

We recently identified vibrational spectroscopic markers characteristic of standard glycosaminoglycan (GAG) molecules. The aim of the present work was to further this investigation to more complex biological systems and to characterize, *via* their spectral profiles, cell types with different capacities for GAG synthesis. After recording spectral information from individual GAG standards (hyaluronic acid, chondroitin sulphates, dermatan sulphate, heparan sulphate) and GAG-GAG mixtures, GAGs-defective mutant Chinese Hamster Ovary (CHO)-745 cells, wild type CHO cells, and chondrocytes were analysed as suspensions by high-throughput infrared spectroscopy and as single isolated cells by infrared imaging. Spectral data were processed and interpreted by exploratory unsupervised chemometric methods based on hierarchical cluster analysis and principal component analysis. Our results showed that the spectral information obtained was discriminant enough to clearly delineate between the different cell types both at the cell suspensions and single cell levels. The ability of the technique is to perform a spectral profiling and to identify single cells with different potential to synthesize GAGs. Infrared microspectroscopy/ imaging could therefore be developed for cell screening purposes and further for identifying GAG molecules in normal tissues during physiological conditions (aging, healing process) and numerous pathological states (arthritis, cancer).

Keywords: glycosaminoglycans; chondrocytes; Chinese Hamster Ovary cells; Infrared spectroscopy; Image analysis; data analysis

FTIR imaging for profiling GAG-synthesizing cells

