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Electrodialytic extraction of anionic pharmaceutical compounds from a single drop of whole blood using a supported liquid membrane

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Abstract

A method to introduce target analytes to a chromatograph from a single drop of whole blood was investigated for minimally invasive monitoring of anionic pharmaceuticals. In this work, salicylate and loxoprofen were examined as organic anions. A micro ion extractor (MIE) has been developed for extraction of inorganic trace anions from whole blood, but this device is not suitable for extraction of pharmaceuticals. In the present study, we improved and optimized the MIE device for organic anion extraction. Various supported liquid membranes were evaluated for use as the ion transfer membrane, with each membrane placed between a droplet sample (donor) and an acceptor solution. A supported liquid membrane of porous polypropylene impregnated with 1-butanol was selected. In addition, the methods for electric field creation and electrode contact were examined to improve the characteristics of the MIE device. The current and extraction time were also optimized. With the optimized method, salicylate and loxoprofen were successfully extracted from a single drop of whole blood. Changes in the concentrations of these pharmaceuticals in blood over time were monitored after administration. As only 25 μL of whole blood was required for analysis, repeat measurements could be conducted to monitor changes in the concentrations. This MIE will be useful for monitoring pharmaceutical concentrations in blood.

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