



Multi-Channel On-Line Microdialysis using an EC Detector with Triple Cell Control

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Introduction

A method has been developed for multi-channel on-line microdialysis, which is particularly useful when experiments must be replicated for statistical relevance. The method uses three HPLC columns in parallel integrated in one DECADE II electrochemical detector with Triple Cell Control (TCC). An example is shown for analysis of serotonin in an on-line microdialysis simulation using dialysis probes.

Method

The microdialysis perfusate of three dialysis probes is sampled in three external 6-port valves. After filling the loops the analysis is started by injecting all loops simultaneously onto three parallel columns. The valves are switched back to load and the process is repeated. HPLC analysis time is within the time needed to fill the loops.

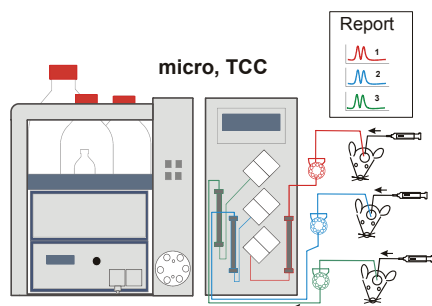


Fig. 1. Samples from three on-line microdialysis experiments are injected simultaneously and analysed in parallel.

Experimental set-up

An ALEXYS 100 LC-EC system is used with three LC columns in parallel. The DECADE II electrochemical detector is equipped with a TCC (Triple Cell Control) configuration. The system was evaluated with serotonin (5-HT) as model compound. Only one HPLC pump is used equipped with a 5 port splitter for analysis of 5-HT. The same configuration is usable for analysis of NA and DA.

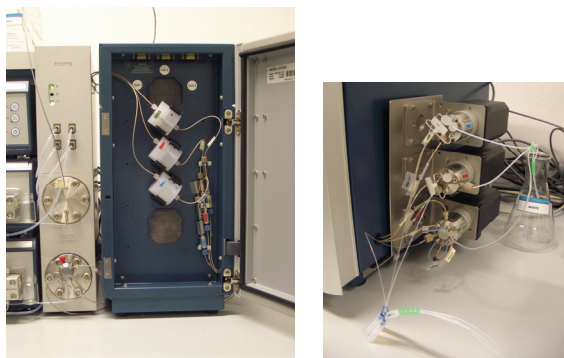


Fig. 2. DECADE II TCC with three columns and flow cells (left). Three external valves are used for injection (right).

HPLC Conditions

Mob. phase 50 mM phosphate buffer pH 6.0, 1% MeOH, 8 mM KCl
Flow rate 150 μ L/min (splitted, 50 μ L/min per LC system)
VInjection 5 μ L, 3 loops in series
Ecell 300 mV vs. ISAAC

Results

A microdialysis setup was simulated by placing the dialysis probes in Ringer solution. After obtaining a few baseline chromatograms, the probes were placed in another vial which contained 10 nmol/L 5-HT in Ringer. After 30 min the probes were placed back in the vial with Ringer. Retention time for 5-HT was about 3 min, the 'perfusate' is sampled and injected every 5 minutes.

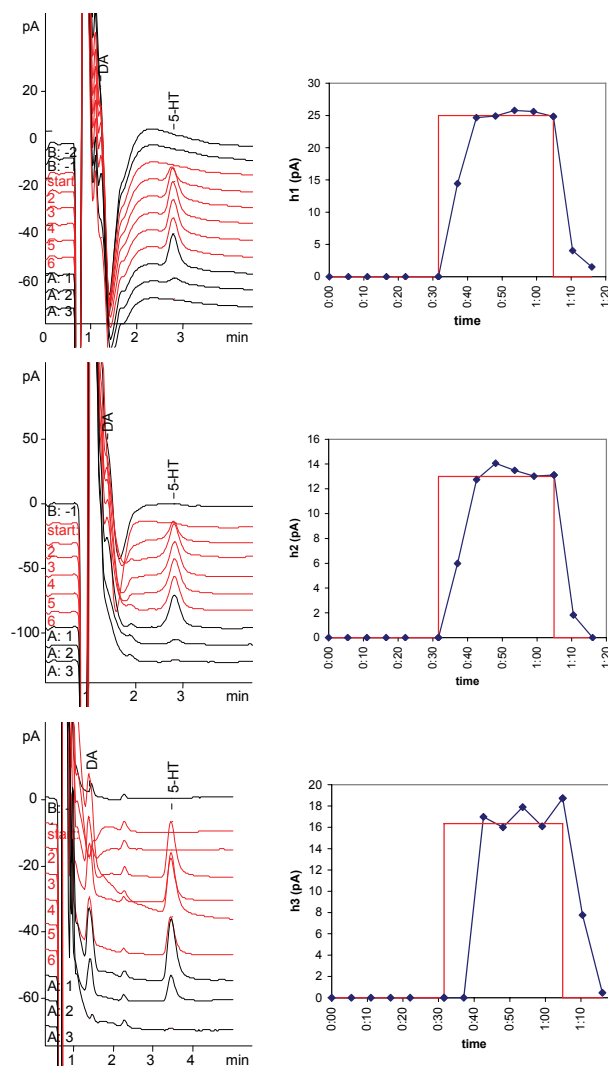


Fig. 3. Chromatograms and response plots using the data obtained by the triplicate on-line microdialysis experiment. The red lines indicate when sampling of 10 nM 5-HT took place.

Conclusion

A method has been developed for triple on-line microdialysis using an ALEXYS 100 LC-EC system with three HPLC columns in parallel. Advantage of the system is that it uses a relatively small footprint, and offers the possibility of running replicates simultaneously.