

# 利用毛細管電泳線上濃縮技術分析氟硝西洋、古柯鹼、鴉片類藥物及其相關代謝物

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## 摘 要

氟硝西洋、古柯鹼與鴉片類藥物為近年來被廣泛濫用之藥物，因此我們選擇了毛細管電泳線上濃縮技術針對氟硝西洋、古柯鹼、鴉片類藥物與其相關代謝物，利用毛細管電泳良好的分離率結合上線濃縮技術，改善其偵測靈敏度來進行研究。

在氟硝西洋與其代謝物方面，利用掃略式線上濃縮技術來進行分析，其最佳分離條件：緩衝溶液為 pH 9.5, 25 mM 四硼酸鈉緩衝溶液、CTAB 50 mM、甲醇 30% (v/v)，樣品區帶為 40 mM 四硼酸鈉緩衝溶液，樣品以 0.5 psi 注入 300 sec，施加 -25 KV 之電壓進行分離。在此條件下氟硝西洋與其代謝物之偵測極限可有效降低至 5.6 ~ 13.4 ppb 之間，堆積效率均在 110 倍以上，在方法的準確度上，對於遷移時間與波峰面積之相對標準偏差(RSD) 小於 4.1%。經過固相萃取去除基質干擾後，可成功地應用在尿液樣品上。

在古柯鹼及鴉片類藥物方面，利用陽離子選擇性全注入結合掃掠式線上濃縮法來進行分析，其最佳分離條件：高導電度緩衝溶液為 pH 4.0, 100 mM 檸檬酸/磷酸氫二鈉緩衝溶液、乙腈 15% (v/v)，背景緩衝溶液為 pH 4.0, 50 mM 檸檬酸/磷酸氫二鈉緩衝溶液、SDS 150 mM，樣品溶液為 1 mM 檸檬酸/磷酸氫二鈉緩衝溶液以 10 KV 電動注入 600 sec，再施加 -25 KV 之電壓進行濃縮與分離，在古柯鹼及鴉片類藥物之偵測極限可有效降低至 0.13 ppb ~ 0.43 ppb 之間，堆積效率均在 2200 倍以上，在方法的準確度上，對於遷移時間與波峰面積之相對標準偏差(RSD) 均小於 4.78%。經過固相萃取去除基質干擾後，也可以成功地應用在尿液樣品上。

# **Analyses of flunitrazepam, cocaine, opiates, and their metabolites by on-line sample concentration techniques in capillary electrophoresis**

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## **Abstract**

Flunitrazepam, cocaine, and opiates are usually used abuse drugs recently. We have developed a on-line sample concentration techniques in capillary electrophoresis for determination of flunitrazepam, cocaine, opiates, and their metabolites. Using capillary electrophoresis has good separation efficiency and on-line sample concentration techniques have good sensitivity, to improve detection limit.

In case of flunitrazepam and it's metabolites, we use sweeping technique. The optimal conditions for separation were achieved at pH 9.5 using a 25 mM borate buffer, 30%(v/v) menthol, 50 mM CTAB, a 300 sec injection time and -25 KV separation voltage. Using sweeping technique, the values of LOD that we obtained were in the range of 5.6 ~ 13.4 ppb. The values of the RSD% for the retention time and the peak area were also < 4.1% and the stacking efficiency were up to 110 times. After solid-phase extraction, we succeeded using this method in urine sample.

In cocaine and opiates, we use CSEI-sweeping-MEKC technique. The optimal conditions for separation were achieved at HCB pH 4.0, 100 mM citric acid/disodium hydrogen phosphate buffer and 10%(v/v) acetonitrile; BGS 50 mM citric acid/disodium hydrogen phosphate buffer and 150 mM SDS; sample solution 1 mM, pH 2.2 citric acid/disodium hydrogen phosphate buffer; electrokinetic injection 10 KV, 300 s; -20 KV separation voltage. Using CSEI- sweeping-MEKC technique, the values of LOD that we obtained were in the range of 0.13 ppb ~ 0.43 ppb. The values of the RSD% for the retention time and the peak area were also < 4.78% and the stacking efficiency were up to 2200 times. After solid-phase extraction, we succeeded using this method in urine sample.

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