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PhD in Pharmaceutical Sciences  
2015-2016

INVITATION to the Public defence of

**Dima ALI E'LAYAN ALBALS**

To obtain the academic degree of '**DOCTOR IN PHARMACEUTICAL SCIENCES**'

**Contributions to Strategy- and Method Development for  
Chiral Separations in Capillary Electrochromatography****Friday 13 November 2015**

Auditorium **Brouwer**, 17:00  
Faculty of Medicine and Pharmacy, Laarbeeklaan 103, 1090 Brussel

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## Summary of the dissertation

The enantioseparation of chiral pharmaceuticals drugs is of major interest in the pharmaceutical industry, aiming to separate the therapeutically active enantiomer from the diastomer, which is required by the regulatory authorities around the world. Capillary electrochromatography (CEC) is an analytical separation techniques that can be successfully used for enantioseparations. For this purpose, different types of chiral stationary phases (CSPs), in particular those based on polysaccharide-derivatives are of interest. In many separation techniques, including CEC, generic separation strategies were defined to facilitate the method development by limiting the number of experiments. They are built as a decision tree which guides the analyst in sequential steps to a successful separation. Improvement or updating these strategies is still necessary to keep pace with the development of new commercial stationary phases that need to be evaluated.

In this work, an existing chiral separation strategy for acidic pharmaceutical compounds using capillary electrochromatography, was updated. The updated strategy included a chlorinated polysaccharide-based CSP as part of the screening conditions because it showed added enantioselectivity and an improved success rate compared to the non-chlorinated CSPs that initially were included in the strategy. Afterwards, this new strategy was combined with another updated chiral separation strategy defined for non-acidic pharmaceutical compounds. The joint strategy summarizes the complete approach to develop a chiral separation method in CEC for all types of pharmaceuticals.

Additionally, a comparison between CEC and different chromatographic techniques (normal-phase liquid chromatography, reversed-phase liquid chromatography, polar organic solvent chromatography and supercritical fluid chromatography) was performed to evaluate the position of CEC among these separation techniques. The screening approaches, defined earlier for the above separation techniques, are applied on a test set of cathinone and amphetamines drugs, to compare their success rates. In the second part of the study, the CEC-strategy stationary phases were screened in all above separation techniques at their specific screening conditions, to evaluate their performance at these conditions, in these techniques compared to that in CEC.

Summarized, in the strategy defined in this thesis, focus was on developing good and many separations. Hopefully it may contribute to the development of chiral separation methods, prior to their validation and real-life application.

## Curriculum Vitae

Dima Albals was born on January 19th 1980 in Irbid, Jordan. In 2003, she obtained the bachelor degree in Pharmacy at Jordan University of Science and Technology (JUST) in Irbid, Jordan. In 2008, she obtained the degree of master in Toxicology and Forensic Science from faculty of medicine at Jordan University of Science and Technology (JUST). In November 2012, she started her doctoral research on chiral separations in capillary electrochromatography at the department of Analytical Chemistry and Pharmaceutical Technology under the supervision of Profs. D. Mangelings and Y. Vander Heyden.

In the context of her doctoral research on the 'Contributions to Strategy- and Method Development for Chiral Separations in Capillary Electrochromatography', Dima published one scientific paper as first author in a Q1 peer-reviewed international journal, while the second is being reviewed. She also presented four posters and gave one oral presentation at national and international symposia.

In 2014, she received a scholarship from the Yarmouk University in Jordan. In January 2016, Dima will join the teaching team as a lecturer in the faculty of pharmacy at the same university.