Differentiation of *Cutibacterium acnes* phylotypes by CE utilizing nano-etched fused silica capillary

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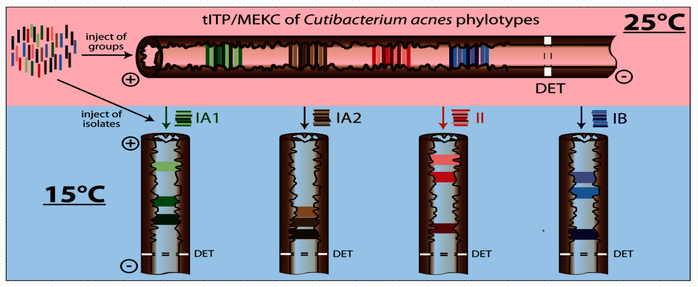
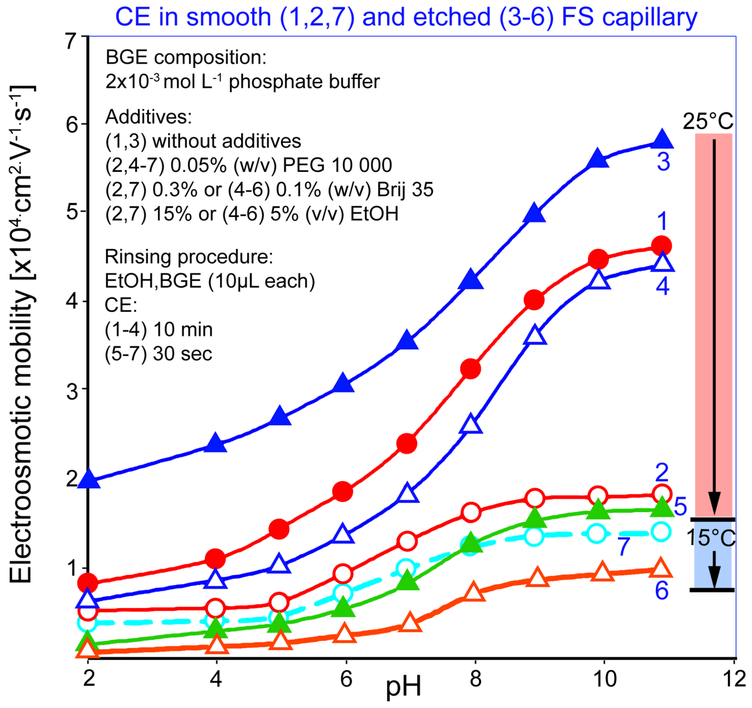
Introduction

Despite being commensal involved in the maintenance of healthy skin, *Cutibacterium acnes* is also associated with inflammatory diseases. Since inflammatory and immunogenic properties vary between *C. acnes* phylotypes, reliable classification of clinical *C. acnes* isolates is important for determining their pathogenicity. Since the phenotypic differences between individual phylogenetic groups are reflected in the cell surface properties and thus electrophoretic properties, capillary electrophoresis could be a suitable tool for discrimination of *C. acnes* phylotypes. Several isolates representing each of the phylogenetic groups (IA1, IA2, IB, IC, II, and III) were selected for this purpose. Combination of optimized separation methods, polymer-enhanced transient isotachophoresis and sweeping of the charged bacterial cells in micellar electrokinetic chromatography in the roughened fused silica capillary, was used for the separation of clinical *C. acnes* isolates.

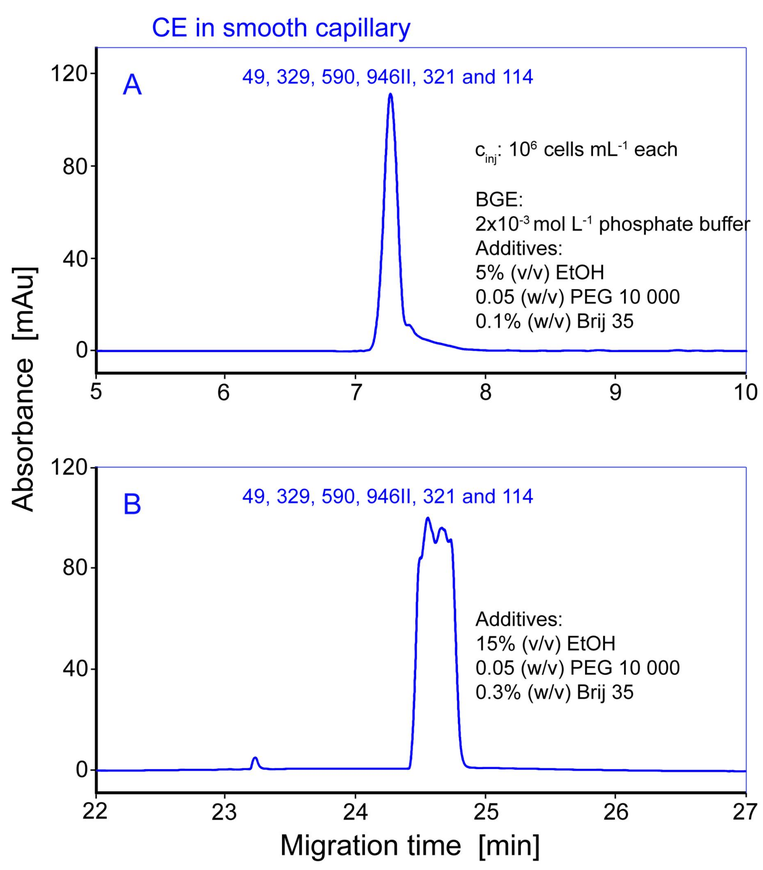


Results

The effect of the capillary surface properties on CE separation of *C. acnes* isolates



The effect of pH on the electroosmotic mobility in original (curves 1, 2, 7) and SCW-etched FS capillaries (curves 3-6) at two different temperatures. Neutral marker of EOF: thiourea; UV detection: 235 nm.



CE separation of *C. acnes* isolates belonging to different phylotypes (IA1, IA2, IB, II, and III) in smooth FS capillary at 25 °C, optimization of the separation conditions.

Acknowledgement

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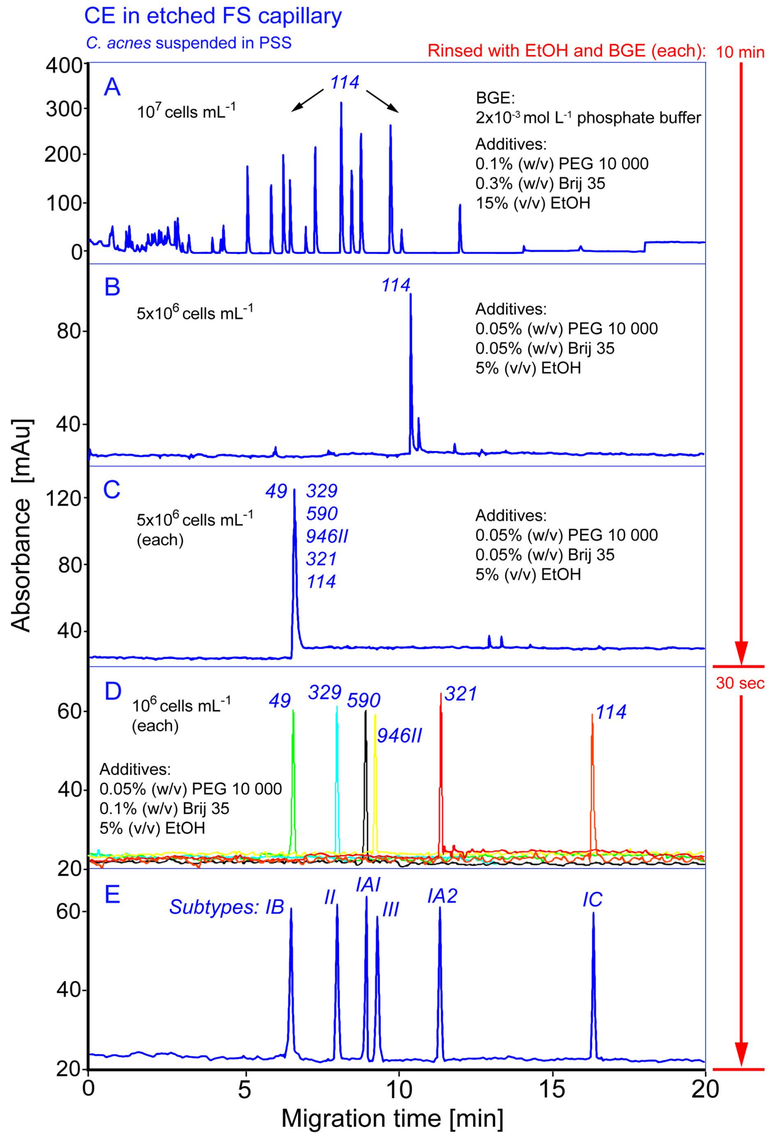
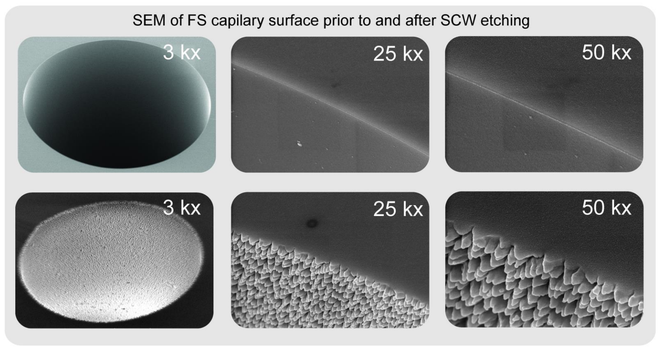
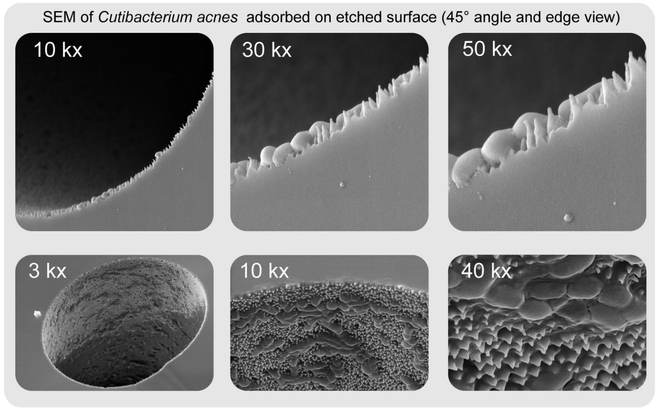
The influence of the BGE composition and the rinsing time on CE separation in the SCW-etched FS capillary



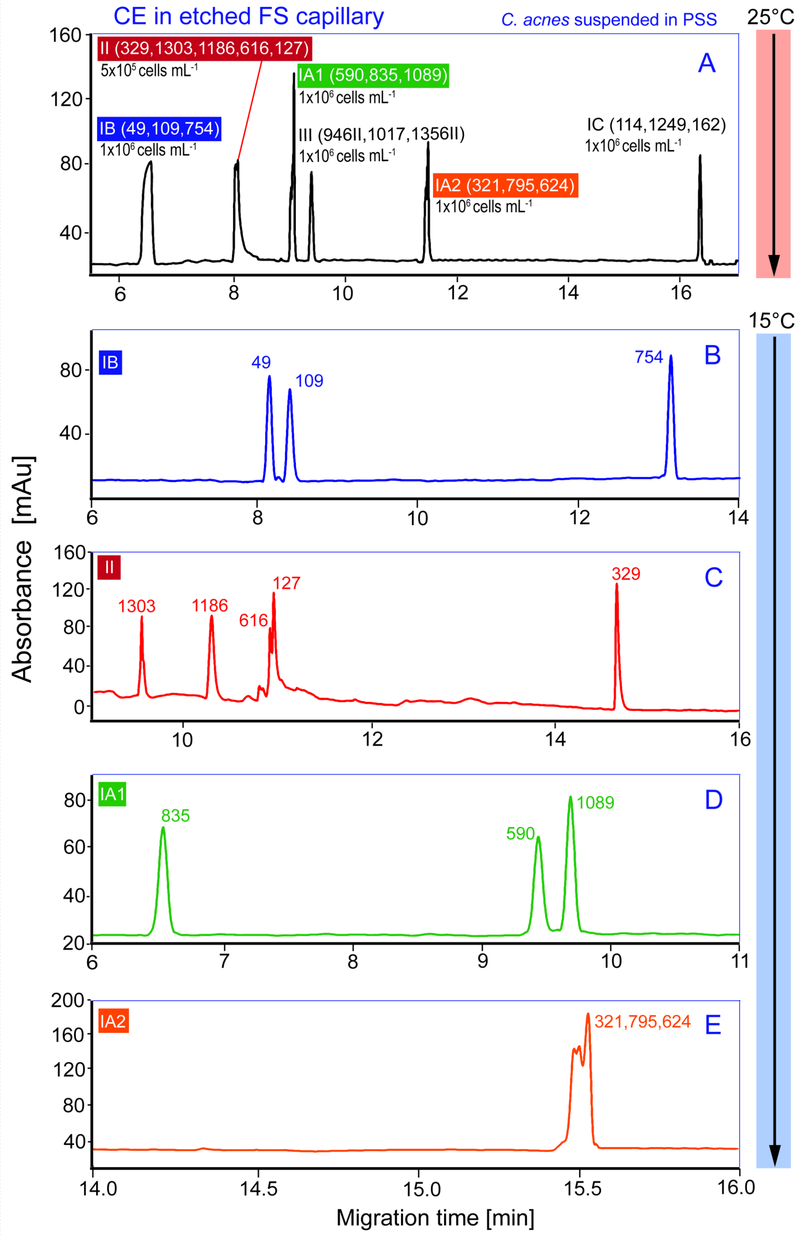
The influence of the BGE composition and the rinsing time on CE separation in the SCW-etched FS capillary.





SEM images: capillary inner surface before and after etching (the upper part) and the bacterial cells adhered to the etched surface (the bottom part).

Separation of *C. acnes* isolates in a mixture at lower temperature



The influence of temperature on the CE separation of the *C. acnes* isolates of the individual phylotypes.

Conclusions

- Accurate classification of clinical *C. acnes* isolates into the individual phylotype groups has been achieved using combination of CE methods in roughened FS capillary.
- Small changes in both the BGE additive concentrations and the rinsing procedure had a great influence on the electroosmotic flow in the roughened FS capillary.
- Experimental conditions were optimized to enable reproducible separation and thus classification of the examined *C. acnes* isolates at the phylotype level.
- The CE analysis is done in 20 min at laboratory temperature.
- Decrease in the separation temperature to 15 °C enabled separation of the individual isolates belonging to the phylotypes IA1, IB, and II.
- Limit of detection for all the examined bacteria was determined as 5×10^5 cells mL^{-1}.