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Identification of DNA by single DNA imaging during electrophoresis

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In principle, an electrophoretic peak in capillary electrophoresis consists essentially of the fluorescence signal from individual DNA which migrates through the capillary. The fluorescence signal comes from the mass of single DNA, which is separated by the electrophoresis, contributes the production of the electrophoretic peaks which appears in capillary electrophoresis. Therefore, the electrophoretic peaks in capillary electrophoresis are strongly depended on the fluorescence signal from the mass of individual DNA during electrophoresis.

Practically, the injection volume of the capillary electrophoresis is approximately 10-20 nano-L. Because the concentration of DNA injected in capillary was about 2 ng/μL, the actual number of the DNA constructed for peaks in capillary electrophoresis was calculated about 12,000 DNA molecules. (at the length of 1,000 bp) In fact, the electrophoretic peaks appeared in capillary electrophoresis is attributed to the migration of 12,000 individual DNA during capillary electrophoresis.

In this paper, we discuss the identification of the length of DNA by single DNA imaging during electrophoresis. And we practically investigated the relationship between the single DNA migration and important electrophoretic parameters and mobility by the statistics of single DNA migration in electrophoresis. From imaging analysis of single DNA migration, we provided the fundamental electrophoretic factors, such as the theoretical plate and mobility. The peak width and the asymmetry of the electrophoretic peaks were attributed from the statistic analysis of the migration imaging of DNA during electrophoresis.