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Short Communication

Effect of ampicillin-sulbactam on clinical capillary zone electrophoresis of serum proteins

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Abstract

Background: Capillary zone electrophoresis (CZE) is a well-accepted automated method used to separate serum proteins and detect monoclonal components. CZE uses ultraviolet detection at 214 nm to directly quantify proteins via peptide bonds. Any substance that absorbs at 214 nm and is present in serum can potentially interfere with CZE analysis. This has been reported for radio-contrast media and antibiotics.
Methods: Here we describe a peak on the anode side of the α_2-globulin fraction caused by the antibiotic ampicillin-sulbactam (Unacid®).
Results and conclusions: Extra peaks that can be misinterpreted as monoclonal components can be present in almost all electrophoretic fractions of CZE. Immunosubtraction or immunofixation is always required to rule out these conditions.
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Keywords: capillary zone electrophoresis (CZE); interference; monoclonal component.

Capillary zone electrophoresis (CZE) has emerged as a well-accepted automated method to separate serum proteins and detect monoclonal components in clinical laboratories (1, 2). CZE is not dependent on dye binding. Instead it uses ultraviolet detection at 214 nm to directly quantify proteins via peptide bonds, in contrast to conventional electrophoretic methods. However, any substance or drug that is present in serum and that absorbs at 214 nm can potentially interfere with CZE analysis. This has been reported for radiocontrast media, which can simulate a monoclonal component (3). Abnormal peaks have also been observed with antibiotics such as piperacillin-tazobactam (anode side of the β-globulin fraction) (4) and sulfamethoxazole (anode side of the albumin fraction) (5). Here we describe a peak at the anode side of the α_2-globulin fraction caused by the antibiotic ampicillin-sulbactam (Unacid®, Pfizer Pharma GmbH, Karlsruhe, Germany).

During daily protein electrophoresis analysis on a Paragon CZE 2000 system (Beckman-Coulter, Brea, CA, USA; Version 2.0.14) a patient sample presented with an extremely sharp peak at the anode side of the α_2-globulin fraction (Figure 1A). Subsequent conventional dye-based protein electrophoresis showed no peak. Neither immunosubtraction on the Paragon CZE 2000 nor additional immunofixation (Paragon IFE, Beckman-Coulter) detected a monoclonal component, and thus a non-protein compound was suspected. The ward reported that the sample was taken while

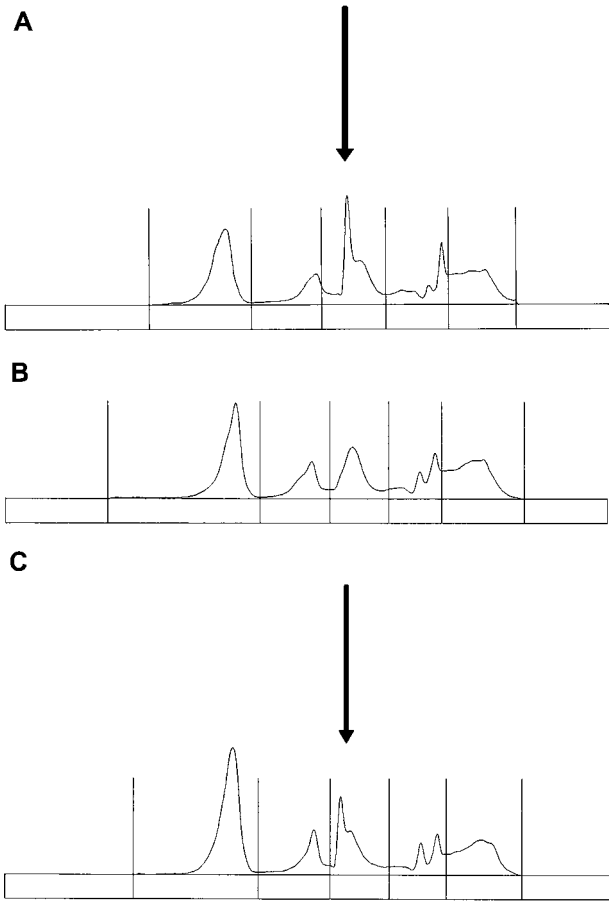

Figure 1 Effect of ampicillin-sulbactam on serum CZE. CZE electropherograms show (A) a patient sample taken during infusion of 2 g of ampicillin and 1 g of sulbactam and (B) a patient sample 2 days later, and (C) a random normal serum sample supplemented with 3 g/L ampicillin-sulbactam.

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the patient was receiving an ampicillin-sulbactam infusion. A sample from the same patient taken 2 days later showed no sign of this peak (Figure 1B). Moreover, addition of ampicillin-sulbactam to a random normal serum sample at various concentrations (0.3–3 g/L) produced a similar, dose-dependent peak at the same location as for the original patient sample (Figure 1C). Further studies revealed that the peak was caused by ampicillin.

This case confirms that substances other than proteins that absorb at 214 nm interfere in CZE and present as extra peaks (3). This has been reported for the antibiotics piperacillin-tazobactam (0.9 g/L) (4) and sulfamethoxazole (0.24 g/L) (5). The extra peak caused by ampicillin-sulbactam (0.3–3 g/L) is located on the anode side of the α_2-globulin fraction and thus could be misinterpreted as a monoclonal component. In summary, different pharmaceuticals can produce extra peaks in almost all CZE fractions (3) and could be suspected or misinterpreted as monoclonal components. Thus, immunosubtraction or immunofixation is always required to rule out these conditions.

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