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Title: Accurate and reliable determination of α 1-antitrypsin levels in respiratory patients using dried blood spot specimens

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Body: Background: The use of dried blood spot (DBS) specimens for the α 1-antitrypsin (AAT) measurement is often limited by low quantity of AAT protein after extraction. The aim of our study was to validate an optimized protocol of AAT quantification from DBS by comparing it with the “gold standard” measurement of AAT level in plasma. Methods: 190 DBS and matched plasma samples were collected from respiratory patients. 6-mm discs were cut from DBS samples and incubated overnight in appropriate volume of the reaction buffer. The determination of AAT concentrations in eluted DBS and plasma samples was performed by a rate immune nephelometric method with a commercially available reagents containing goat anti-human AAT antibody (Beckman-Coulter, USA). Results: the optimized method of AAT quantification allowed successful AAT level determination in all analyzed DBS samples. The ranges of AAT concentration for DBS and plasma were 0,078-2,1 mg/dL and 16–350 mg/dL, respectively. The regression curve of DBS to plasma AAT concentrations presented coefficient of determination (R²) above 0,85 and the following equation: $Y(\text{mg/dL}) = 169,5 \cdot X + 18,482$. Calculated AAT DBS concentrations did not differ significantly from reference plasma values ($p=0.0000$). Conclusion: the optimized method of DBS AAT level determination provide statistically equivalent quantitative results to plasma-based reference. As demonstrated, AAT level measurement in DBS is sufficiently linear, sensitive and accurate to support the laboratory diagnostics of AAT deficiency and therefore is appropriate for clinical practice.