Introducing fast measurement of suPAR in the Emergency Department using Lateral Flow Technology

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Background: A high suPAR (soluble urokinase receptor) level at admission to the Acute Medical Unit is a marker of severe disease and associated with increased risk of readmission and mortality while a low suPAR level is associated with low risk of severe disease and mortality. suPAR may therefore aid in the decision to admit or discharge the patient. However, current technologies are too time consuming (minimum 2 hours) to provide fast suPAR results, and thus results may arrive after the clinicians have made the decision to admit or discharge the patient. Here we present a new lateral flow assay, suPARnostic® Quick Triage, that provide suPAR results in less than 25 minutes.

Methods: A lateral flow assay was developed using the VG-1 and VG-2 anti-human suPAR antibodies. These are the same clinical antibodies used in the suPARnostic ELISA product range. The lateral flow assay was developed in a collaborative effort between BBI Solutions (United Kingdom) and ViroGates (Denmark). EDTA blood samples were centrifuged for 1 minute at 3000 g. Ten microliter (µl) plasma was mixed 100 µl buffer and 60 µl of this mixture added to the suPARnostic® Quick Triage stick. After 20 minutes of incubation, the suPAR level was quantified using an optical reader (Figure 1).

Results: A quantitative lateral flow device, suPARnostic® Quick Triage, for point-of-care determination of suPAR levels was successfully developed with a clinical relevant working range of 2-16 ng/ml (Figure 1). The correlation between suPAR levels measured using suPARnostic® ELISA and suPARnostic® Quick Triage was found to be 0.94.

Conclusion: We have successfully developed a fast point-of-care lateral flow device for quantification of suPAR. A randomised intervention study using suPARnostic® Quick Triage is currently ongoing in two large Danish hospitals in the capital region. The aim is to establish the effect of implementing quick suPAR testing on reduction of unnecessary admissions and/or mortality (ClinicalTrials.gov number, NCT02643459).

Figure 1. suPARnostic® Quick Triage lateral flow device (left) and optical reader (right).