Development of a Micro Erythrocyte Sedimentation Rate System with the Potential for In-Home Use

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Student Research Paper Abstract

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ABBREVIATIONS: ESR = erythrocyte sedimentation rate; S/P = Scientific Products.

INDEX TERMS: blood sedimentation; capillary-erythrocyte sedimentation rate; erythrocyte sedimentation rate; micro erythrocyte sedimentation rate; sedimentation rate.

OBJECTIVE: To develop a micro erythrocyte sedimentation rate (ESR) system using capillary blood with potential for in-home use by patients.

DESIGN: Blood was collected in EDTA and the cells were separated from the plasma. Plasma was divided into three aliquots and spiked with defined amounts of fibrinogen. Fifteen hundred microliters of autologous cells were resuspended in 1500 µL of plasma. ESRs were performed using the Westergren method and four potential micro ESR systems, utilizing a micro-hematocrit tube, Scientific Products (S/P) capillary blood gas tube, Natelson blood collecting tube, and Caraway micro blood collecting tube. Micro ESR results were correlated to the Westergren results.

SETTING: Saint Louis University.

PATIENTS/SAMPLES: Twenty-eight volunteers between the ages of 18 and 60 with no underlying conditions other than the common cold.

INTERVENTIONS: Hematocrit was standardized to approximately 40% for all samples and fibrinogen concentrations of approximately 200 mg/dL, 382 mg/dL, and 563 mg/dL were achieved for each subject.

MAIN OUTCOME MEASURES: ESRs were measured in mm/hour and percentage. Micro ESR values were plotted versus Westergren ESR values and the data were analyzed using Pearson correlation.

RESULTS: When compared to the Westergren ESR method, the following correlation coefficients were achieved: S/P tube (r = 0.808), Caraway tube (r = 0.797), Natelson tube (r = 0.719), and micro-hematocrit tube (r = 0.655).

CONCLUSION: Three of the four micro ESR methods tested achieved acceptable correlation coefficients, with the potential of being converted into a capillary ESR system for in-home use.

This student research paper is the winner of the ASCLS Education Scientific Assembly (ESA) 2004 competition for CLS/CLT student research papers and case studies. Student Research Papers were to address scientific as well as applicable educational, technical, administrative, consulting, and management studies. The student must be a current ASCLS member and have been enrolled in a NAACLS accredited CLS/CLT program at the time the research was conducted. The student winner of the research paper award receives an all-expense paid trip to the ASCLS annual meeting in Los Angeles, California on July 27 – 31, 2004, to present their paper and will be honored at the awards ceremony during the ASCLS annual meeting. In addition the paper will be submitted for publication in a future issue of Clinical Laboratory Science.

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