itations of our study that enrolled only a small number of patients. To test the hypothesized benefits of our approach, considering its feasibility, it should be studied in a larger cohort of patients under the age of 50 years.

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Performance evaluation of the CoaguChek S system

This evaluation was performed to investigate the agreement of international normalized ratio (INR) test results obtained with the new CoaguChek S system and the current CoaguChek system. The bias between the systems was negligible. The regression lines were not significantly different from the line of identity. The CoaguChek S meters showed a significantly lower meter-to-meter variability than the CoaguChek meters.

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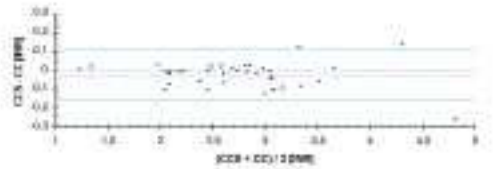
The CoaguChek system is a portable device designed for measuring the prothrombin time (PT) in point-of-care testing and in patient self-testing. The international normalized ratio (INR) scale of the system has been calibrated by the manufacturer (Roche Diagnostics, Mannheim, Germany) in accordance with WHO recommendations.[1] The CoaguChek PT test gives reliable results[2] and has proved its worth in over 50,000 patients performing self-management of oral anticoagulation.[3]

The new CoaguChek S system was introduced recently, with improvements in size, design and user-friendliness. It uses the same test strips as the CoaguChek system. The aim of the performance evaluation study presented here was to investigate the agreement of the INR results obtained with the CoaguChek S and the CoaguChek systems.

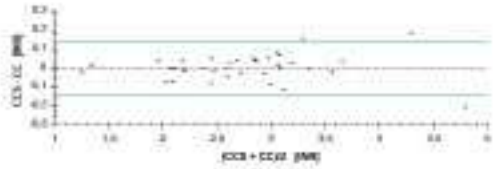
A venous whole blood sample from each of 38 patients was analyzed in parallel on 24 CoaguChek meters and 24 CoaguChek S meters using two different lots of test strips (lot 152 and 153). Quality control measurements with CoaguChek PT control solutions were carried out each test day on all meters. In addition, the corresponding citrated plasma of each patient was collected, stored frozen, and tested using three different thromboplastins: Neoplastin, Hepato Quick (Roche Diagnostics, Mannheim, Germany; STA Compact analyzer) and Innovin (Dade-Behring, Marburg, Germany; MLA 900 analyzer). The statistical methods used to evaluate the results were: a) bias including 95% confidence interval (CI) in Bland-Altman-plots;[4] b9 regression analysis by the method of Passing and Bablok;[5] c) relative bias: mean of all [(INRCCS – INRCC) / INRCC]; d) analysis of variance; e) Bennett's test for the comparison of coefficients of variation (CV).

Results. All determinations with liquid quality control solution were found to be within the specified control range. For each patient, a series of 12 measurements was performed for each of the two test strip lots on each of the two types of meter. The coefficients of variation (CV) for the measurements, calculated from the individual values of all 38 patients, ranged from 5.2 to 6.7%. The CV of the meter-to-meter variability for the 24 CoaguChek S meters was 1.1%, compared with 3% for the 24 CoaguChek meters ($p<0.01$). In the case of CoaguChek S, individual meters showed fluctuations in data varying by between -1.9% and +2.0% of the overall mean value.

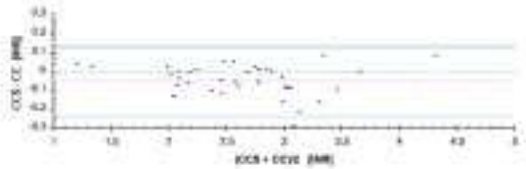
Comparisons between the CoaguChek S and CoaguChek systems. Regression analysis of the measured data yielded a correlation coefficient of > 0.99. The slopes of the regression lines for the combined and the individual lots were not significantly different from 1. The bias in the data obtained with CoaguChek S and CoaguChek was –0.03 INR (CI: -0.004 to –0.049), corresponding to a relative bias of -0.9%. This bias was statistically



a) Combined test strip lots:
bias = -0.03 INR (CI: -0.049 - -0.004); SD = 0.07 INR; LL = -0.17 INR; UL = 0.11 INR

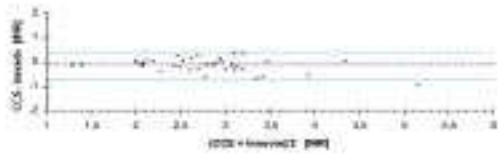


b) Test strip lot 152:
bias = 0.002 INR (CI: -0.021 – 0.025); SD = 0.07 INR; LL = -0.14 INR; UL = 0.14 INR

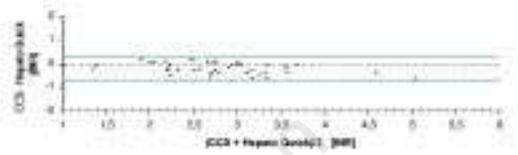


c) Test strip lot 153:
bias = -0.05 INR (CI: -0.084 – -0.024); SD = 0.09 INR; LL = -0.23 INR; UL = 0.13 INR

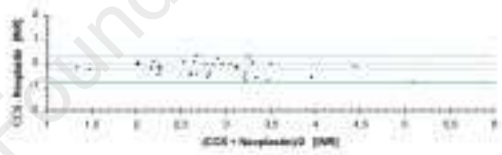
Figure 1. Bland-Altman plots: CoaguChek S (CCS) versus CoaguChek (CC).



a) CoaguChek S versus Innovin:
bias = -0.11 INR; SD = 0.28 INR; LL = -0.67 INR, UL = 0.45 INR



b) CoaguChek S versus Hepato Quick:
bias = -0.20 INR; SD = 0.24 INR; LL = -0.68 INR, UL = 0.28 INR



c) CoaguChek S versus Neoplastin:
bias = -0.24 INR; SD = 0.28 INR; LL = -0.80 INR, UL = 0.32 INR

Figure 2. Bland-Altman plots: CoaguChek S (CCS) versus laboratory thromboplastins.

significant, but clinically not relevant. Bland-Altman plots including lower (LL) and upper limits of agreement (UL) are illustrated in Figure 1.

In the analysis of variance, no significant meter type-specific influences on the test results were detected ($p>0.05$).

Comparisons between the CoaguChek S system and the laboratory methods. For each patient, the CoaguChek S INR values were compared with those obtained by the laboratory methods using the corresponding citrated venous plasma. A total of 38 measured values (obtained with the two different test strip lots) were included in the evaluation. The bias ranged from –0.24 INR versus Neoplastin (r=0.934) and -0.20 INR versus HepatoQuick (r=0.957) to –0.11 INR versus Innovin (r=0.939). Bland-Altman plots including lower (LL) and upper limits of agreement (UL) are shown in Figure 2.

The comparison between the INR values obtained by the CoaguChek S and CoaguChek instrument platforms showed a bias of 0.03 INR which is statistically significant but no clinically relevant. The confidence interval of the bias was well below ±0.1 INR, and the limits of agreement (2 SD) in the Bland-Altman plots were found to be within ±0.2 INR around the bias. Therefore the INR values determined with CoaguChek S showed outstanding clinical agreement with the analysis results obtained in parallel with the conventional CoaguChek meter. Furthermore, the INR results of CoaguChek S were in good agreement with the results obtained by the different laboratory methods, and showed good precision with whole blood. Instrument scatter of the CoaguChek S meters was significantly lower than that of the CoaguChek meters.

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Reliability of measurements of serum alanine transaminase activity and the impact on the cut-off value for the selection of blood donors

The alanine-transaminase (ALT) threshold for screening blood units is not homogeneous in italian blood centers and this phenomenon produce a great variability in the donor-acceptance rate. The standardization of ALT cut-off level, unifying the statistical methods to calculate the threshold of acceptance, would decrease the variability between centers.

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Before the discovery of hepatitis C virus (HCV) and development of the HCV assay, serum alanine transminase (ALT) levels were used to identify donors potentially infected with non-A non-B hepatitis.[1] In some countries, transfusion centers (TC) continue to use ALT testing in screening donors, despite this practice being controversial[1,2] in that although it reduces the residual risk of post-transfusional hepatitis,[1,3-4] it decreases the donation acceptance-rate. In Italy, although ALT levels continue to be used in blood screening, the regulations governing their use are insufficient,[5,6] and the existing guidelines[7] for determining ALT cut-off levels are not mandatory. Consequently, blood donated by persons with the same ALT level can be accepted by one TC yet rejected by another.

We conducted a study to describe the variability among TCs with respect to the methods used for measuring serum ALT levels and for calculating the cut-off levels for accepting blood donations, in order to evaluate the impact of these factors on the donation-acceptance rate.

Nine TCs in Italy participated in the study, providing information on the assay used to measure ALT levels, the cut-off ALT level adopted, and the method used to calculate this level. The TCs analyzed, in duplicate, serum samples taken from the same 20 blood donors (M/F: 14/6; mean age: 42 years; range: 18-50 years) with ALT levels slightly higher than the normal level [1.1-

Table 1. Relationship between the ALT measurement of each transfusion center (TC) and the reference center (TC no. 2).

TC	*Regression model* $y_i^* = a + b \times_2 °$	*Correlation coefficient*	*Standardized ALT cut-off level#*
1	$y_1 = 13.19 + 1.11 \times_2$	0.98	73.47
2	$y_2 = x_2$	–	54.31
3	$y_3 = - 2.79 + 1.05 \times_2$	0.99	54.23
4	$y_4 = - 2.44 + 1.17 \times_2$	0.99	61.10
5	$y_5 = - 1.85 + 0.95 \times_2$	0.99	49.74
6	$y_6 = 0.49 + 0.93 \times_2$	0.99	51.00
8	$y_8 = 0.11 + 1.21 \times_2$	0.99	65.82
9	$y_9 = -3.41 + 1.08 \times_2$	0.99	55.24

**y_i=TC$_i$ ALT value; °$\times_2$ = TC$_2$ ALT value; #by regression model.*

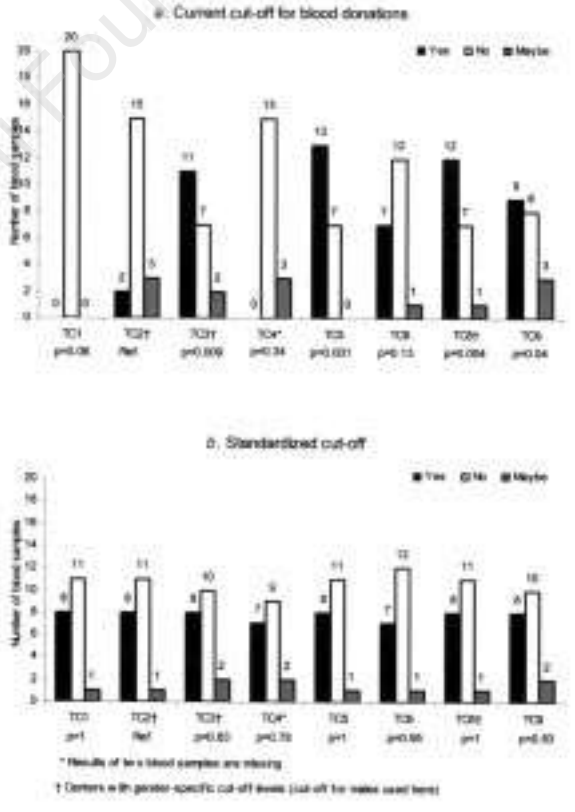

Figure 1. Classification of the suitability of blood samples (n=20) for donation by transfusion center (TC) and the statistical significance of the difference between each TC and the reference center (TC no. 2). The classification of the suitability of blood samples for donation was based on two repeated ALT measurements. The classification categories were: *yes*, if both results were lower or equal to the cut-off level; *no*, if both were higher, and *maybe* if discordant.