ACCURATE ESTIMATION OF DELIVERED DIALYSIS DOSE 
BY ON-LINE ULTRA VIOLET ABSORBANCE 
IN THE SPENT DIALYSATE 
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Introduction
The dialysis dose has been reported to have a great significance for the outcome of the dialysis treatment. A new technique for on-line monitoring of solutes in the spent dialysate utilising the UV-absorbance has been established, enabling one to follow a single haemodialysis session continuously and monitor deviations in dialysis efficiency. A good correlation between UV-absorbance and urea enables determination of Kt/V for urea.

The aim of this study was to compare equilibrated urea Kt/V from on-line UV-absorbance measurements (eKt/Va), by a new algorithm developed to calculate Kt/V using on-line UV-absorbance (eKt/Vn), and the urea Kt/V obtained from the blood samples according to the rate adjustment method (eKt/Vb).

Subjects and Methods
This study was performed after approval of the Ethics Committee at the Department of Nephrology, University Hospital of Linköping, Sweden. An informed consent was obtained from all participating patients. 8 uremic patients, 4 females and 4 males, mean age 63.5 years, range 20-81 years, on chronic thrice-weekly haemodialysis were included in the study during 49 haemodialysis treatments.

The clinical set-up utilised a spectrophotometer (UVIKON 943, Kontron, Italy) connected to the fluid outlet of the dialysis machine with all spent dialysate passing through an optical cuvette (Figure 1). The spectrophotometer measured UV-light absorption at wavelength 285 nm.

The new algorithm to calculate Kt/V was obtained using regression analysis including several dependent parameters like Kt/V from on-line UV-absorbance (Figure 2), dialysis length, blood flow rate, dialyzer’s urea clearance in-vitro, patient’s dry body weight, and indication for diabetes as a dummy variable.

Accuracy = 100*(eKt/Vb - eKt/Va)/eKt/Vb

when calculated for eKt/Va, eKt/Vn was used instead of eKt/Va when Accuracy was calculated for the new algorithm. Students t-test (two tailed) and Levene Test of Homogeneity of Variances were used to compare means for different methods and SD values respectively.

Results
The mean value of eKt/V obtained with UV-absorbance (eKt/Va) was 1.19 ± 0.26, using the new algorithm (eKt/Vn) was 1.30 ± 0.21, and eKt/V from blood-urea (eKt/Vb) 1.30 ± 0.22 (N = 49 for all methods) (Figure 3). The mean values of eKt/Va and eKt/Vb were statistically different (P < 0.05). This difference or systematic error can be eliminated by adjusting the mean eKt/Va value. eKt/Vn and eKt/Vb were not statistically different (P > 0.05). The SD-s were not significantly different (P > 0.64) for any methods.

Conclusion
The presented results show the possibility to estimate urea eKt/V with a high accuracy utilising the new algorithm based on on-line UV-absorption measurements in the spent dialysate.

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