情報電子工学科　論文発表

題名	Reagentless Estimation of Urea and Creatinine Concentrations Using Near-Infrared Spectroscopy for Spot Urine Test of Urea-to-Creatinine Ratio
掲載雑誌	Advanced Biomedical Engineering, Vol. 7 (2018) p.72-81. (https://doi.org/10.14326/abe.7.72)
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概　要	We have developed a measurement system that uses LEDs to estimate multiple components such as urea and creatinine in spot urine samples using near-infrared spectroscopy by using several LED as light sources. In this study, 10 standard wavelengths (1400–2300 nm, in 100 nm increments) were chosen for measurement. Then, a multiple regression analysis using all combinations of 10 wavelengths was performed. Wavelength selection was performed by comparing the minimum standard error of prediction (SEP, calculated from actual concentration and predicted concentration) for each wavelength combination and found resultant selection of wavelength. Finally, we obtained high accuracy for estimating urinary urea and creatinine levels using four wavelengths for urea and five wavelengths for creatinine. Furthermore, an extremely high correlation coefficient ($\gamma > 0.99$) was obtained for both components. We calculated urea concentration, creatinine concentration, and urea-to-creatinine ratio using this optical, reagentless method. The low SEP and high γ show that our method is suitable for practical determination of urea-to-creatinine ratio. Thus, this method of analyzing urine samples using NIR spectroscopy can be used to assess protein intake in CKD patients. This paper is available online at "http://abe-journal.org/issues/2018/04/11/382".