

Rapid measurement of plasma concentration of a vancomycin with diamond sensor.

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Vancomycin is a glycopeptide antibiotic that kills bacteria by blocking the construction of the cell wall and used to treat different bacterial diseases including meningitis and methicillin - resistant *Staphylococcus aureus* infections. Because this antibiotic can sometimes induce renal failure and hearing loss, the plasma concentration is monitored to adjust the dose applied to individual patients. In this study, we show a rapid and simple procedure with an electrochemical approach. The sensor we used consisted of a boron-doped diamond electrode, which elicits more stable reaction than classical materials such as carbon and gold. With this sensor we examined guinea-pig plasma containing vancomycin at different concentrations. The procedure we developed allowed us to complete a series of measurement in 35 sec. Time necessary for all the processes including a sample's pretreatment did not exceed 10 min. The sensor detected the drug concentration of 1 to 50 μM , which falls into the range of the therapeutic window. Moreover, we found that the sensor was repeatedly usable for the measurement with minimal impairment of the sensitivity. The methodology described here may contribute to not only advances in personalized medicine but also reduction of the cost for therapeutic drug monitoring.