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Rapid measurement of plasma concentration of a molecular-targeted agent, pazopanib, with diamond sensor.

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Molecular-targeted anticancer drugs elicit less toxicity than conventional reagents. Yet, patients often suffer from severe adverse effects. A reason is 'fixed dosage' administration of the drug to all the patients regardless of their body size and complications; because of this strategy, the plasma concentration seems to exceed the therapeutic window occasionally. Although frequent measurement of the drug level at a clinical site is a solution, currently available methods such as mass spectrometry are time and cost consuming. To overcome these shortcomings, in this study, we developed a procedure with an electrochemical sensor composed of a conductive diamond, which yields more stable reactions than conventional materials. When guinea-pig plasma mixed with pazopanib, a multi-kinase inhibitor, was tested, the sensor detected a clinically relevant concentration of 3 to 300 μM. Time and sample amount necessary for each series of the measurement was <1 min and 100 μL, respectively. The sensor was repeatedly usable with minimal impairment of the sensitivity, saving the cost for the assay. This rapid and easily-handed method may enable therapeutic drug monitoring and accelerate tailored medicine for cancer.