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Electrochemical detection of damage DNA in biodosimetry

Ionizing radiation has a very negative effect on human health, and therefore emphasis is placed on the most accurate determination of the size of absorbed dose in irradiated persons. The current trend of retroactive determination of absorbed dose of ionizing radiation focuses on methods to track changes at the cellular and molecular level of the organism. The goal of biodosimetry is to seek effective approaches and methods to as accurately and as quickly as possible estimate the absorbed dose in irradiated persons. The availability of rapid diagnosis and detection of the extent of damage to an individual in case of exposure to ionizing radiation and the start of rapid appropriate treatment could be very useful, especially at the present time of political turmoil and fear of impending terrorism. Herein the comparison of the possibilities of the classical biocompatibility method of micronucleus test with new approaches such as the use of flow cytometry for detection of γH2AX and electrochemical detection of damaged DNA. In recent years, the use of small electrochemical sensors has been a great trend in rapid and yet sensitive analysis of substances of various kinds. Electrochemistry can study the structure or potential damage of nucleic acids, analyze substances interact with DNA, or detect oxidative stress products as signs of radiation damage. Electrochemical detection of nucleic acids using printed carbon electrodes could thus serve to retroactive determination of the received dose and thus to become a fast, accurate and sensitive biodosimetric instrument.

Keywords: biodosimetry; DNA damage; micronucleus; H2AX; electrode; electrochemical detection

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