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ITER AND RUSSIAN THERMONUCLEAR INSTALLATIONS: BIOMEDICAL METHODS OF RADIATION PROTECTION AND MONITORING *)

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Modern biomedical methods play a crucial role in ensuring safety at large fusion facilities like ITER. One of the key radiation risks involves neutron emission, reaching around 14 MeV, generated by fusion reactions. An additional danger comes from tritium, which emits beta particles. Although beta radiation has low penetration, it poses a serious threat when ingested, causing DNA damage and increasing risks of cancer and other diseases.

To mitigate these risks, ITER utilizes extensive biomonitoring and biosensors to track radiation exposure and promptly respond to excessive doses, thereby preventing radiation-induced illnesses among personnel. Antioxidants, such as vitamins C and E, are also important in protecting cells, as they effectively reduce oxidative stress and cellular damage caused by radiation exposure [1].

In addition, Russia is developing pioneering regulatory standards specifically for fusion and hybrid reactors [2]. These guidelines aim to adapt radiation safety controls to the unique conditions of ITER and other future domestic installations, setting new benchmarks in fusion safety management.

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