Abstract

We are constantly exposed to a variety of factors which may be a cause of DNA mutations. The influence of mutagens of physical, chemical and biological origin is studied by genotoxicology.

Ionic radiation is among the most common physical mutagens, benzene, vinylchloride or some drugs represent the chemical mutagens, while some viruses and may act as biological mutagens.

The repair mechanisms of double strand breaks can be divided into those that require HRR-homologous sequences and those that may use of microhomologies consisting of a short DNA sequence (NHEJ). Both mechanisms can lead to aberrations of chromosomes, if they are not precise.

Acquired chromosomal aberrations include translocation, common in cancer cells; deletion; or the production of acentric fragments, dicentrics and rings. Chromatid aberrations includes chromatid breaks and chromatide exchanges.

There are various methods for detecting/examining such mutations and these can be categorised according to the phases of the cell cycle. The basic method is clasic Giemsa stain which reveals the most of aberrations except translocations and inversions and numeric abnormalities in metaphasic cells. Another way of testing mutagenicity is determining the rate of sister chromatide exchange; or the so called micronucleus test used to measure the quantity of acentric fragments and dicentric chromosomes.

Other methods are based on molecular cytogenetic techniques, including classic FISH or interphase FISH.