

Radioinduced Bystander Effect Revealed in vitro and in vivo In Mixed Human Lymphocytes Culture

O. Shemetun, O. Talan and M. Pilinskaya

*Research Centre for Radiation Medicine AMS of Ukraine, Melnikova street, 53, 04050 Kijiv, Ukraine**shemetun@bigmir.net*

The new methodic approach to the investigation of radioinduced bystander effect in somatic human cells with the help of G-banding cytogenetics had been elaborated. The frequency of chromosome aberrations had been studied in proposed by us model system - "mixed human peripheral blood lymphocytes culture" consisted from cells differed on cytogenetic sex markers (XX, XY) and some morphological chromosome peculiarities. 88 cultures (separate and joint) from 5 couples of donors had been established and 9234 G-banded metaphases had been scored. It had been shown that joint cultivation of intact lymphocytes did not influence upon background frequency of chromosome aberrations in mixed culture. Under joint incubation of X-irradiated in vitro (in doses 250 and 1000 mGy) and intact lymphocytes the dose-dependent interaction between marked cellular population and untargeted cells had been established - under both doses mean-group cytogenetic effect in bystander cells (4.31 and 6.13 of chromosome aberrations per 100 metaphases) that cultivated with irradiated ones (6.99 and 21.19 of chromosome aberrations per 100 metaphases) elevated their background level (2.27 per 100 metaphases). In mixed cultures established from unexposed donors and Chernobyl liquidators (with radiation doses in range 1010-2370 mGy) the frequencies of aberrations in irradiated cells were $5,21 \pm 0,89$ per 100 metaphases, in bystander cells - $4,05 \pm 0,64$ per 100 metaphases (under $5,63 \pm 0,98$ and $1,73 \pm 0,65$ per 100 metaphases in separate cultures). The difference between spectrum of aberrations in exposed and intact cells had been established both in vitro and in vivo - in targeted cells specific cytogenetic markers of irradiation dominated (unstable and stable chromosome exchanges), as well as in "bystander" cells simple aberrations (chromatid breaks and terminal chromosome deletions that can be consider as the markers of chromosome instability) mainly induced. All cytogenetic effects mentioned above had been characterized by essential interindividual fluctuations. Data received confirmed as the reality of bystander effect in vitro and in vivo as well as the possibility of the revealing of such effect in proposed by us "mixed human peripheral blood lymphocytes" model system.