3 - 50 Slowly Proliferating Bystander Cells Carry Long-term Genomic Instability after Radiation

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Genomic instability after radiation is the main reason of the increase of malignancy degree and normal tissue transformation[1]. Previous study indicated that bystander cells show more long-term genomic instability after radiation[2].

In this study, non-small cell lung cancer cell line (A549) was radiated with X-rays (30 kV of 2 Gy), and the conditioned medium was transferred to bystander cells. The fast and slowly proliferating populations in bystander cells were isolated by the colony formation assay. After one month, the chromosome number (Table 1, Fig. 1), drug resistance ability (Fig. 2) and cancer stem-like cell enrichment (Fig. 3) were investigated in fast and slowly proliferating cells, respectively.

Table 1 The chromosome number of slowly and fast proliferating bystander cells and untreated cells (CK).

Group	Chromosome number (n=100)					
	40∼ 50	51∼ 60	61∼70	71∼80	Mode	Average
CK	2	17	70	11	61∼70	64.6
Slow	1	12	65	23	61∼70	67.7
Fast	2	18	70	11	61∼70	64.4

The result shows that compared to the fast proliferating and CK groups, the slowly proliferating cells contained more chromosome (n=100). Based on the measured survival fractions, the slowly proliferating cells exhibit more resistance to cisplatin (10 μg/ml, 12 h) than the other groups and the differences between groups were significant. Furthermore, using Hochest 33342 and PI staining, the stem-like cells were observed in each group. The slowly proliferating cells contained higher percentage of cancer stem-like cells than others. Our data suggest that the long-term genomic instability is carried by slowly proliferating population in bystander cells after radiation.

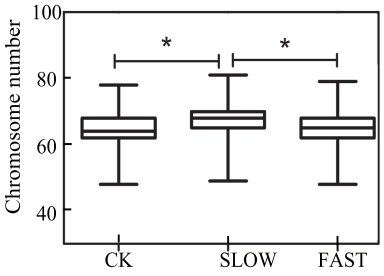

Fig. 1 The box plot of chromosome number for each group.

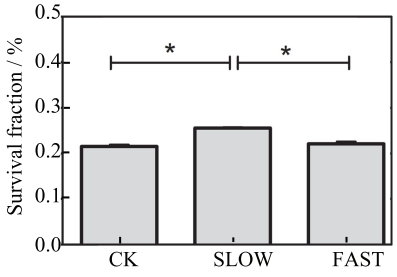

Fig. 2 The survival fractions of cells in all groups treated with cisplatin.

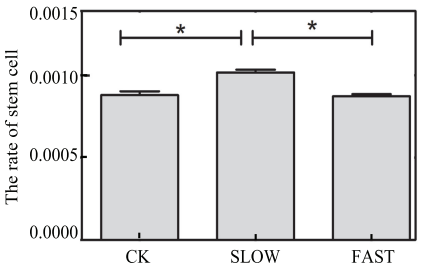

Fig. 3 The contents of cancer stem-like cells in all groups.

References

[1] E. I. Azzam, J. P. Jay Gerin, D. Pain. Cancer Letters, 327(2012)48.

[2] T Zhao, F. Ye, P. B. He, et al., Nuclear Physics Review, 30(2013)494.