

Analysis of Gene Expression and DNA Copy Number in Malignant Lymphomas Developed from Mice Continuously Exposed to Low-Dose-Rate Gamma-Rays

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Abstract

We previously found that life-shortening in B6C3F1 mice continuously irradiated at a low-dose rate (LDR; 20 mGy/22h/day) accumulating to high dose of 8000 mGy for about 400 days was due to early death from a variety of neoplasms including malignant lymphomas (MLs). In this study, we investigated changes in gene expressions of 20 MLs from both irradiated and non-irradiated control mice using a microarray to characterize gene expression profiles of MLs induced by continuous LDR irradiation. Hierarchical clustering analysis on genes relating to cell growth and cell death could identify a group of MLs named group A (total 11 MLs; 9 from irradiated and 2 from non-irradiated mice), which had a specific gene expression profile characterized by up-regulation of genes of cell surface receptors linked to signal transduction such as *Alk*, *Cd30*, and *Il2ra*. The array-based comparative genomic hybridization (aCGH) analysis on these MLs showed that the gain region including the *Il2ra* gene on chromosome 2 was observed more frequently in group A than non-A group MLs. These results suggest that alterations of expression and DNA copy number of *Il2ra* gene might be the main contributors to development of group A MLs.

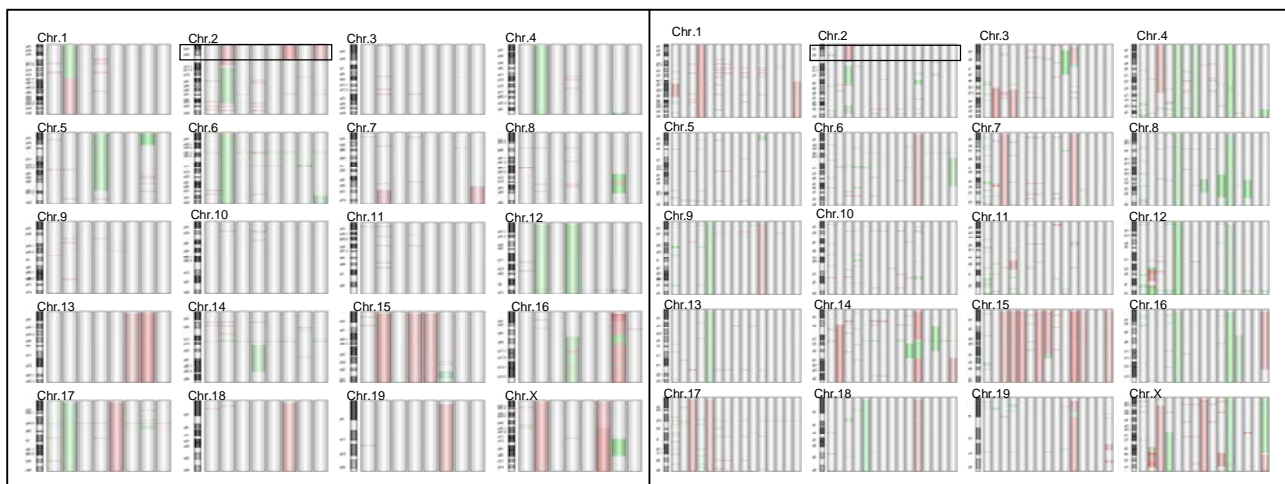


Fig. 1 Comparison of aCGH results in group A (left side, n=8) and non-A group MLs (right side, n=15).

DNA copy numbers of MLs are shown in order of chromosome (Chr.) 1 to 19 and X. Red: loss, green: gain.

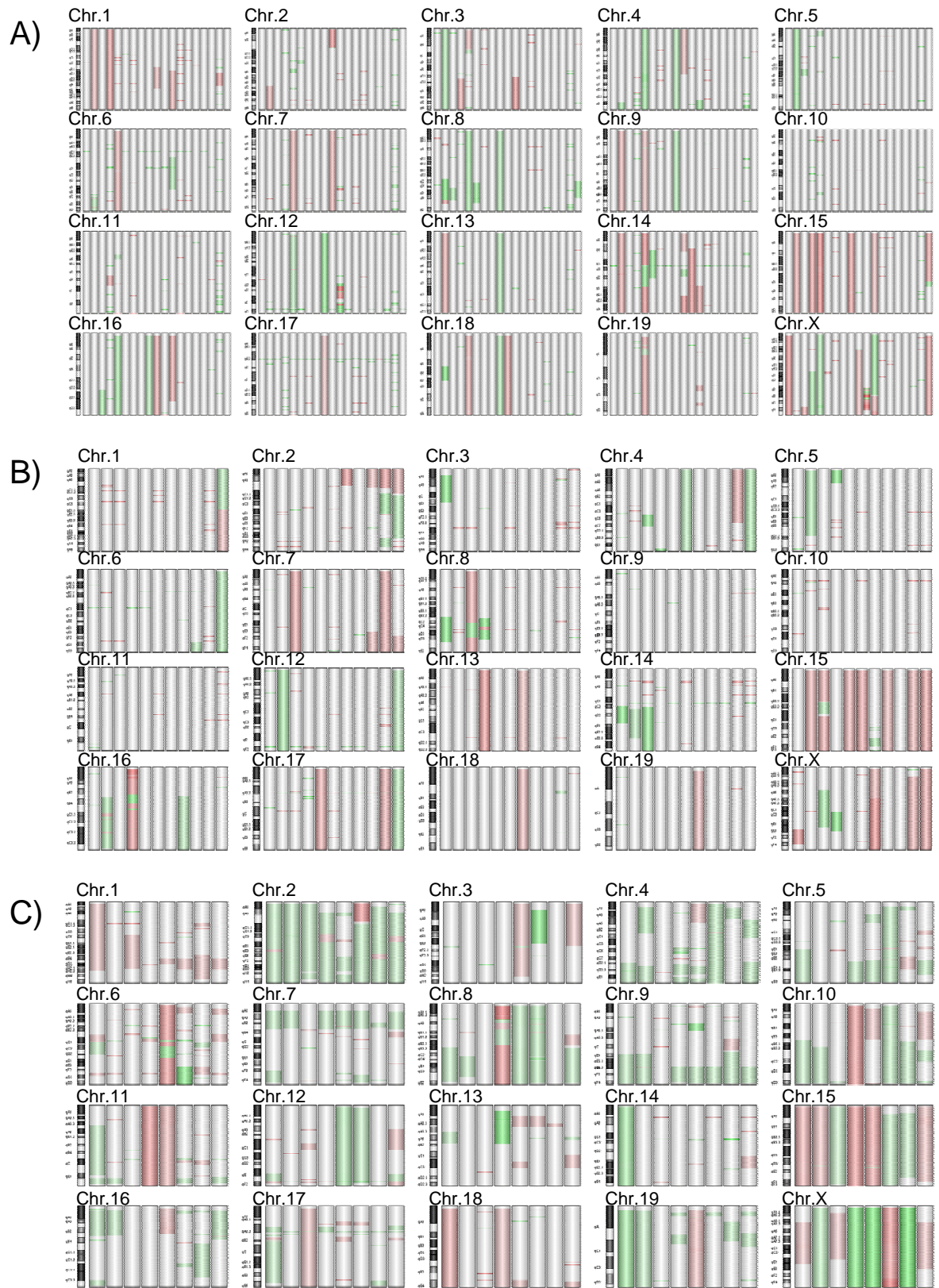


Fig. 2 Comparison of aCGH results of MLs from A) non-irradiated mice (n=19), B) low-dose-rate (20 mGy/22h/day) γ -ray-irradiated mice (n=11), and C) middle-dose-rate (200 mGy/22h/day) γ -ray-irradiated mice (n=8).

DNA copy number of MLs are shown in order of chromosome (Chr.) 1 to 19 and X. Red: loss, green: gain.