

# Chromothripsis-like patterns are recurring, but heterogeneously distributed features in cancer: A survey of 22,347 genomic copy number profiles

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**Abstract.** Chromothripsis is a newly discovered type of genomic rearrangement, characterized by locally clustered copy number aberrations. It has been proposed that it may arise during a single genome shattering event. It provides an alternative paradigm in cancer development, replacing the gradual accumulation of genomic changes with a one-off catastrophic event. However, the underlying mechanisms and its specific impact on tumorigenesis are still poorly understood. Here, we identified chromothripsis-like genome patterns (CTLP) in 918 cases, from a dataset of more than 22,000 oncogenomic arrays including 132 cancer types. Fragmentation hotspots were found to be located on chromosome 8, 11, 12 and 17. Among the various cancer types, soft tissue tumors exhibited particularly high CTLP frequencies. Genomic context analysis revealed that CTLP rearrangements frequently occurred in genomes harboring multiple additional copy number aberrations (CNAs). An investigation into the affected chromosomal regions showed a large proportion of arm-level pulverization and telomere related events, which would support breakage-fusion-bridge cycles as one of the potential underlying mechanisms. We also report evidence that this catastrophic event may be correlated with patient age, stage and survival rate.

**Keywords:** Chromothripsis, Breakage-fusion-bridge cycle, Oncogenomic array