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DNA Replication Timing: From Basic Mechanisms to Biological Functions

Guest Editors:

Dr. Jafar Sharif

Developmental Genetics
Laboratory, Center for Integrative
Medical Sciences (IMS), RIKEN
National Research and
Development Agency, 1-7-22
Suehiuro-cho, Tsurumi-ku,
Yokohama-shi, Kanagawa-ken
230-0045, Japan

Dr. Shin-Ichiro Takebayashi

Department of Biochemistry and
Proteomics, Graduate School of
Medicine, Mie University, Tsu 514-
8507, Japan

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Message from the Guest Editors

DNA replication is a fundamental biological process required for copying genetic and epigenetic material prior to cell division. In prokaryotes, DNA replication occurs at well-defined loci known as replication origins. The situation, however, is more complex in eukaryotes due to the differences in genome size, and genomic contents, such as repeat load. It is estimated that there could be tens of thousands of putative replication origins in the eukaryotic genome that fire stochastically in the S phase. Eukaryotic replication origins are also regulated in a strict temporal manner, with some origins firing early and others firing late. By labeling proliferating cells with thymidine analogs such as BrdU (Bromodeoxyuridine, 5-bromo-2'-deoxyuridine) or EdU (5-Ethynyl-2'-deoxyuridine), it has become possible to map the replication timing of the genome into early, mid or late replicating regions. These studies have revealed that in higher eukaryotes, e.g., mammals, replication domains are intricately linked with large genomic compartments known as TADs (topologically-associating domains) and LADs (lamina-associated domains).



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Special Issue



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Neuroscience, UMN Twin Cities,
6-145 Jackson Hall, 321 Church St
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Copenhagen, Copenhagen,
Denmark

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Cells Editorial Office
MDPI, Grosspeteranlage 5
4052 Basel, Switzerland

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