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Mechanistic study of human DNA replication proteins that regulate cell proliferation and differentiation

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Proper organ development requires the precise regulation of both the total number of cells (cell proliferation) and the types of cells (cell differentiation). During cell proliferation, Cdt1 mediated loading of DNA helicase (Mcm2-7) to replication origins is required for DNA replication. And Hox gene activation is necessary for embryonic cell differentiation. It has been shown that these two processes are linked through the cell cycle-regulator Geminin and the homeodomain-containing transcription factors Hox. To understand the molecular mechanism involved, we determined the solution structures of Geminin-Hox, Orc6-DNA, G-quadruplexand Cdt1-Mcm6 complexes by nuclear magnetic resonance (NMR) spectroscopy and conducted biochemical study to delineate the structural basis of this mutual regulation. In addition, we found that histone H4-K20 methyltransferase SET8 is a new cell-cycle regulator and plays an important role in the developmental program of metazoans. We are studying the human DNA replication initiation and its relationship with EBV mediated cancers (These works are supported by RGC, HMRF, NSFC, and AoE/M-06/08)

Biography:

Dr. Guang Zhu is a Professor of Division of Life Science, The Hong Kong University of Science and Technology. He obtained his B. Sc and M. Sc in physics. He studied for his Ph.D degree at University of Maryland and National Institutes of Health, USA, specialized in biomolecular NMR spectroscopy. Currently Dr. Guang ZHU's research focuses on structure-functional study of human proteins in DNA replication. Studies on the molecular mechanisms of proteins involved in DNA replication provide basis for structure-based drug design against cancer. He has published more than 81 peer-reviewed reports. He has served on the editorial boards of International Journal of Spectroscopy and Chinese Journal of Magnetic Resonance.