

KARL-FRIEDRICH BONHOEFFER AWARD LECTURE

Sir Paul Nurse

The Francis Crick Institute, London, UK

Controlling the Cell Cycle

Both S-phase and M-phase are common to both mitotic and meiotic cell cycles and are necessary for newly divided cells to receive a full complement of genes. In fission yeast the onset of S-phase and M-phase during both mitosis and meiosis can be brought about by a single cyclin dependent kinase replacing the 4 mitotic and 6 meiotic CDKs. In vivo protein kinase assays have shown that the substrate specificity is very similar for G1/S and G2/M CDKs. Increasing levels of CDK activity bring about progression through the major events of cell cycles in an orderly fashion. Using phosphoproteomics we show that a low CDK activity is sufficient to bring about S-phase whilst a high activity is needed for onset of mitosis. A G2 cell can be programmed to undergo either S-phase or M-phase simply by modifying CDK activity indicating there is no inherent arrow of time in the cell cycle. In vivo protein kinase assays show protein kinase activity increases 50-fold during the cell cycle, and part of this span of activity is related to cellular localisation. The accumulation of G2/M cyclin through the cell cycle could act as a measure of cell size, followed by a bistable switch of tyrosine phosphorylation control of CDK to bring about irreversible entry into mitosis.

Monday, 30.10.2023, 2:00 pm

Host: Patrick Cramer



▶ **Manfred Eigen Hall**

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