

[Talk 18] Propagation of gene expression noise by RNA polymerase in living cells

Lee Nam Ki, POSTECH

Cell-to-cell variation resulting from noise in gene expression is a general phenomenon in cells, which often determines a cell's variability, adaptation, and fate. Transcription, i.e., the process of generating mRNA, is the key stage of noise generation in cells. However, how the noise, or variation, in RNA polymerase (RNAP) concentration is propagated to downstream gene expression noise remains unknown. Here, we quantitatively investigate the propagation of RNAP noise and find that intrinsic noise is independent of RNAP noise, whereas extrinsic noise scales linearly with RNAP noise. Specifically, the propagation of RNAP noise to downstream protein noise is inversely proportional to the RNAP concentration, which suggests that the propagation of RNAP noise is determined by the fraction of the promoter that is not occupied by RNAP. In the second part, I will introduce a novel single-molecule fluorescence approach for studying transcription in living bacterial cells. I will show how the transcription and translation are coupled in living bacteria and their effect on gene localization