Interferon-γ induction of GBP5 in HeLa cells

Clayton W. Seitz

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The principle of Interferon-γ induced transcriptional memory

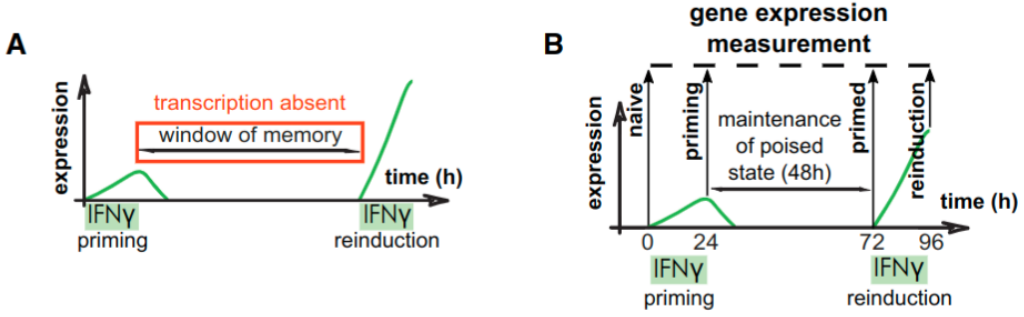
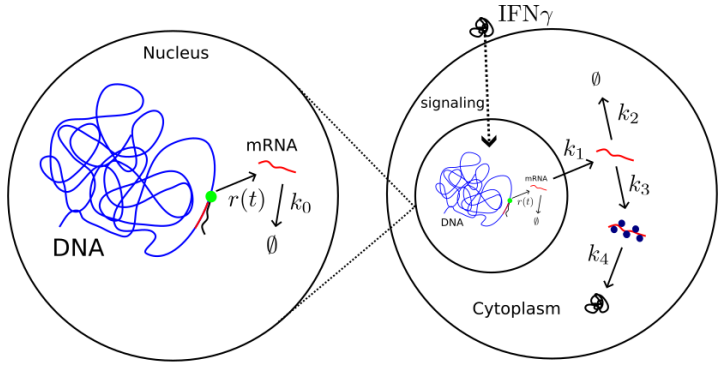
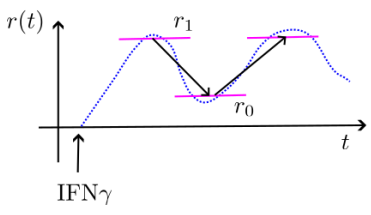


Figure 1

Siwek et al. *Activation of Clustered IFNg Target Genes Drives Cohesin-Controlled Transcriptional Memory*. Molecular Cell 2020

RNA flow model for transcription dynamics and RNA transport





active gene — pre-mRNA — polysome

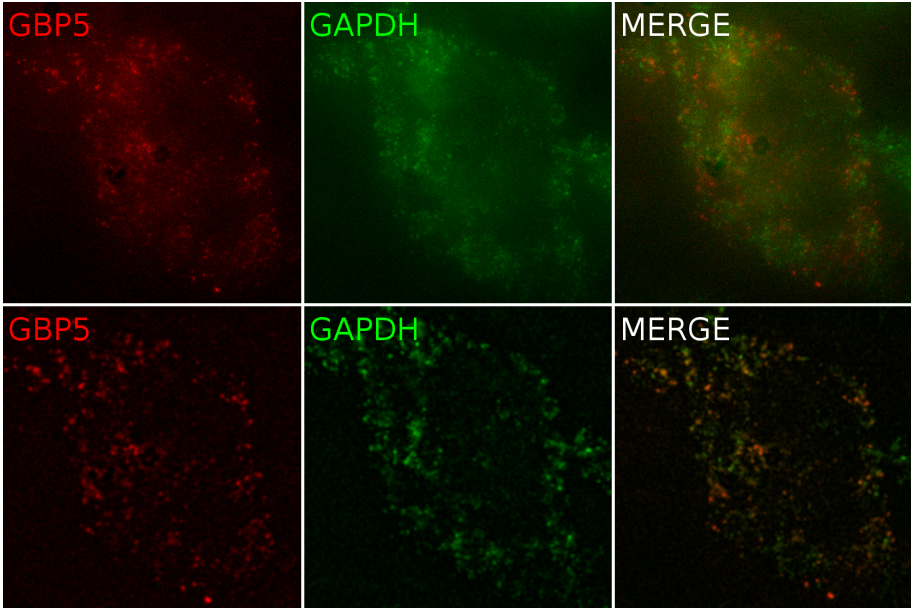
$$\mathbf{x} = (x_1, x_2, x_3, x_4, x_5, ...)$$

inactive gene — cyt mRNA

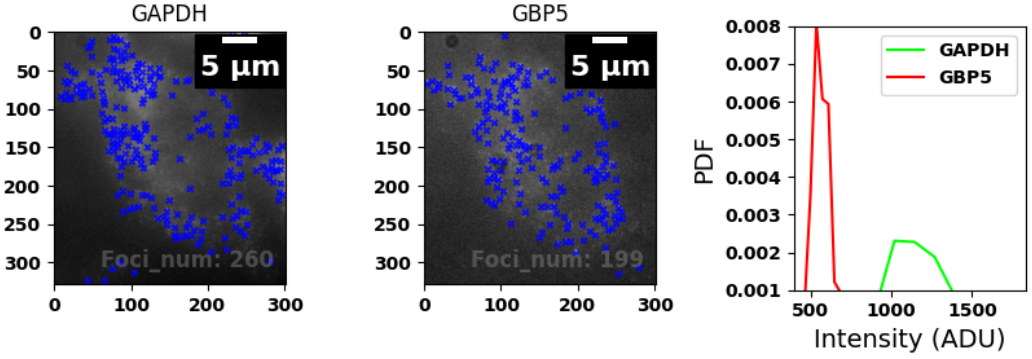
Rare HeLa cell GBP5 expression @ 24h after reinduction with IFN-γ

Show tiled images Needs validation in another cell line

Rare HeLa cell GBP5 expression @ 24h after reinduction with IFN-γ

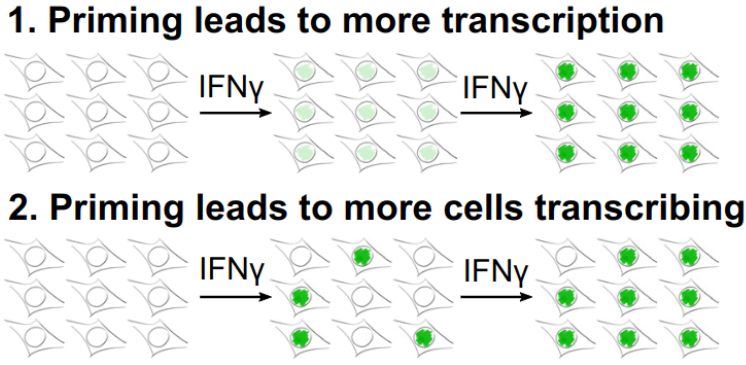


Intensity histogram for rare GBP5 expression



- Very few ($\sim 1\%$) reinduced cells express GBP5, but those that do express at high levels (relative to GAPDH)
- Control sample validates this effect is coupled to IFN-γ

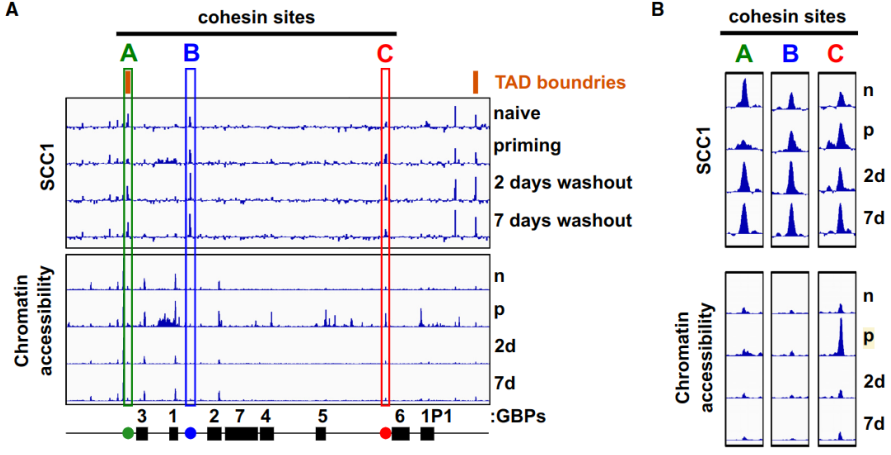
Comments on ergodicity of transcription



- RNA flow cannot apply to non-ergodic systems (yet ergodicity is often assumed)
- Previous work suggests that IFN-γ induces epigenetic changes at the GBP5 locus
- What is the epigenetic change? Is the epigenetic change all or nothing?

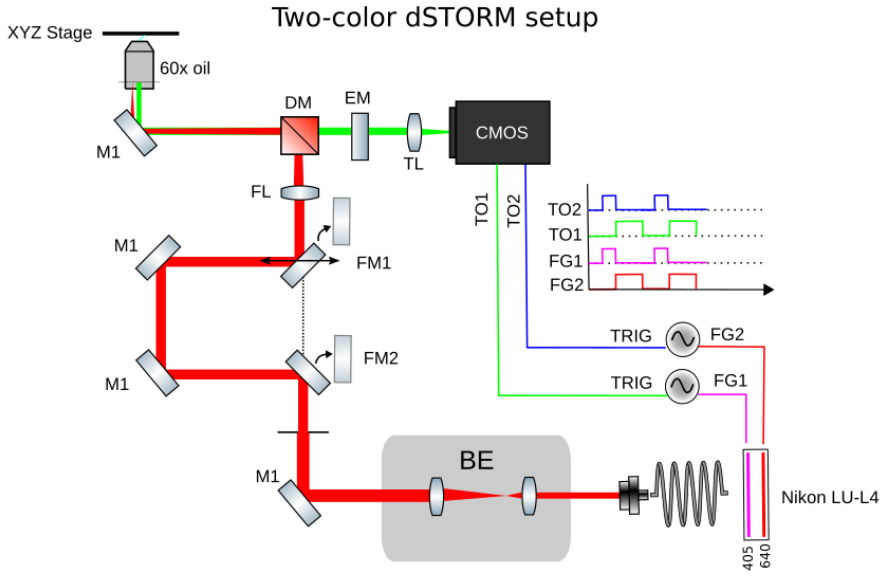
Epigenetic changes at GBP genes after IFN-γ treatment

Siwek et al. *Activation of Clustered IFNg Target Genes Drives Cohesin-Controlled Transcriptional Memory*. Molecular Cell 2020



Measuring epigenetic changes with super-resolution imaging

Details on STORM timing setup



Using STORM to measure epigenetic changes

But it is difficult to study epigenetic changes at a single gene, without additional methods e.g., DNA FISH + STORM microscopy. Let's talk about STORM