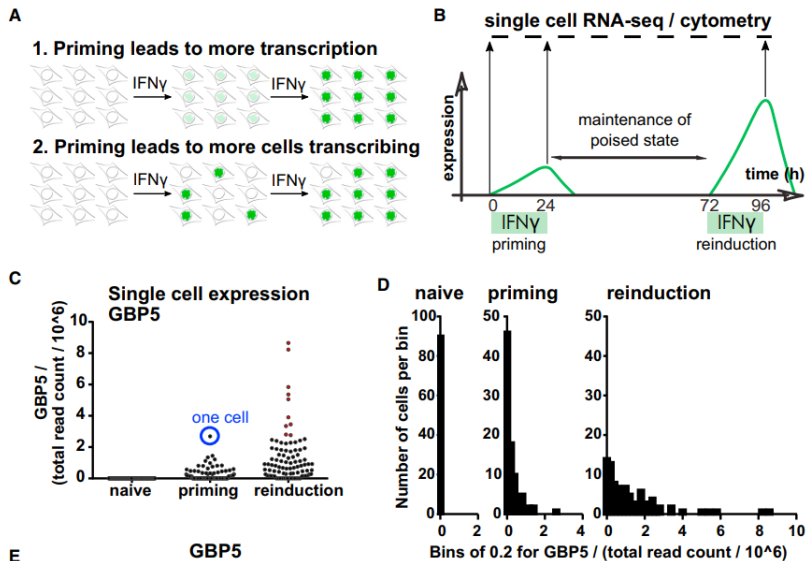# Interferon-γ induction of GBP5 expression in HeLa cells

Clayton W. Seitz
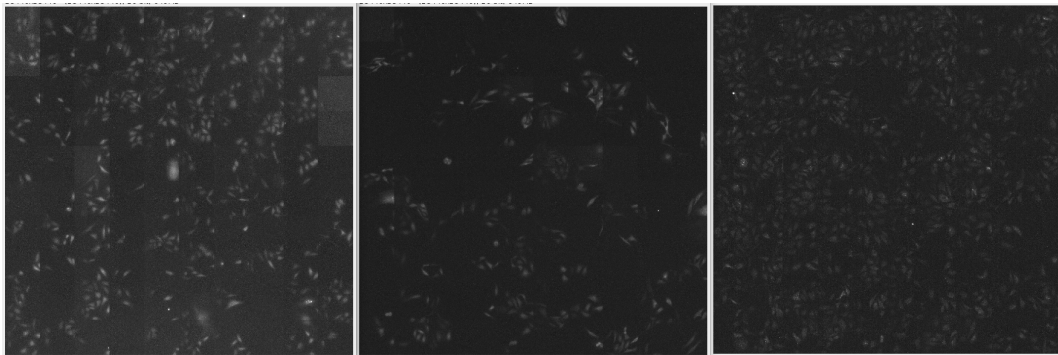
January 2, 2023

Single-cell RNA-seq identifies GBP5 as a memorized gene

Siwek et al. *Activation of Clustered IFNg Target Genes....* Molecular Cell 2020
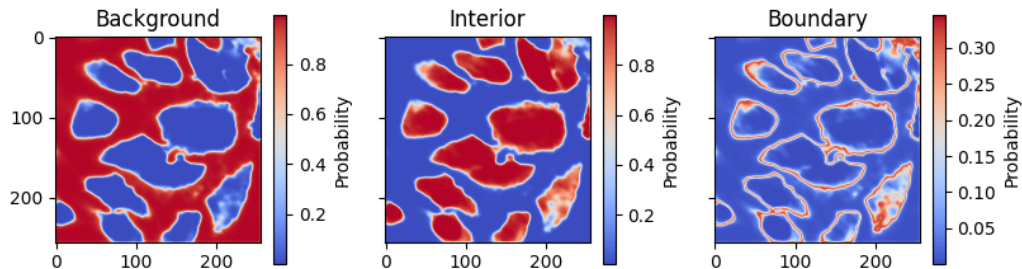
GBP5 imaging approach

High-throughput 3D acquisition of DAPI + FISH probes for GAPDH, GBP5 mRNA in Hela cells on #1.5 chambered coverglass, 60x oil

But as usual, segmentation is the rate-limiting step

Training a semantic segmentation with cross-entropy loss (log loss)

100 256 x 256 images (downsampled GAPDH channel), 80 train + 20 validation,

We train a 3-class semantic segmentation model with cross-entropy loss:

$$\mathcal{L} = \sum_{i,j} \log p_{ij}(\tilde{x}) = \sum_{i,j} \log \frac{\exp(-s_{ij}(\tilde{x}))}{\sum_{x \in \chi} \exp(-s_{ij}(\tilde{x}))}$$

p_{ij} is the probability the model assigns a pixel to the true class $\tilde{x} \in \{a, b, c\}$