

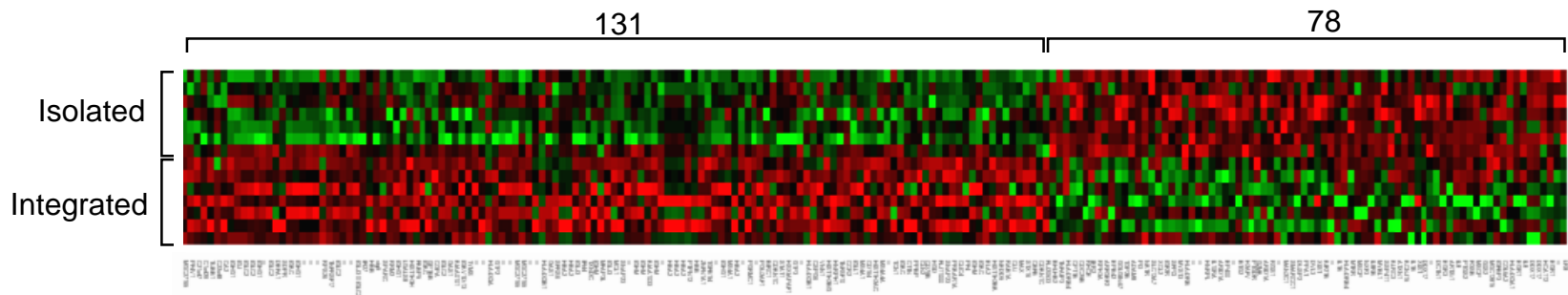


# RNA Analyses in Population, Community, and Field Studies

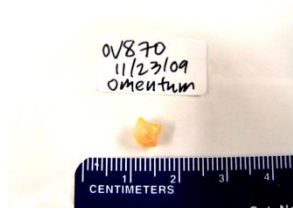
USC/UCLA Center of Biodemography and Population Health  
UCLA Social Genomics Core Laboratory

# Genome-wide transcriptional profiling

1. Proximal determinant of health
2. Socially/behaviorally/environmentally modifiable (potential mediator)
3. Large effect sizes
4. Bioinformatically extensible



**How can we do this in Population / Demog field studies?**



## Field-friendly virtues

## WBC / Tissue

No venipuncture required



Delayed lab processing



Stable over time / temp



Self-sample / mail



High RNA yield



High RNA integrity



Validated against PBMC

N/A

# RNA Comparison Study

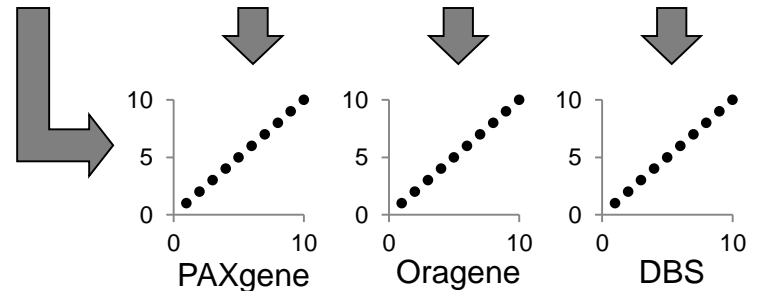
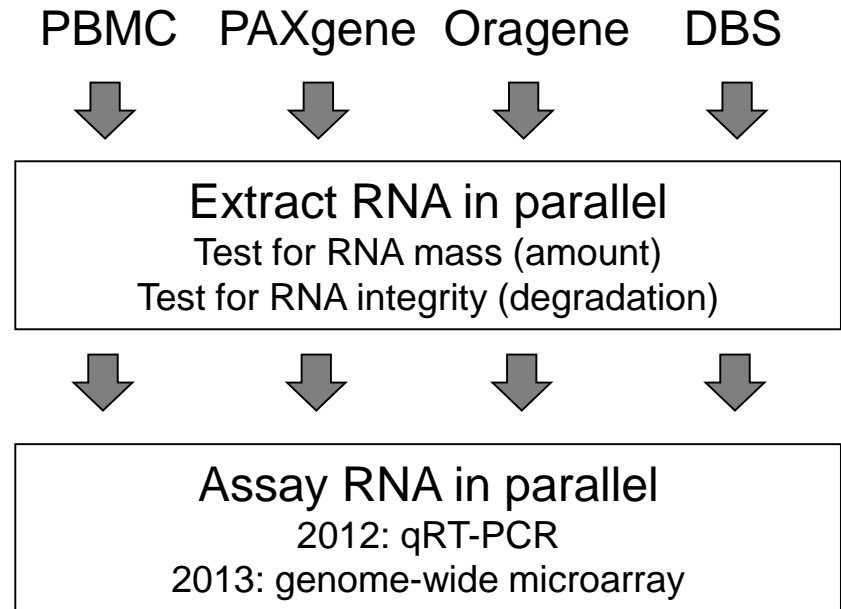
59 generally healthy adults  
Sampled for diversity in chronic inflammation

Age: 30 young (21-31 yo), 29 older (51-98 yo)  
BMI: 17-39 (50% > 25, 14% > 30)

Female = 81%  
Male = 19%

White = 44%  
Asian = 24%  
Hispanic = 14%  
African American = 14%

Rx Med = 51%  
OTC Med = 17%



# RNA Comparison Study: Take-home points

1. Gene expression profiling **is feasible** in DBS.

Reliably detect ~75% of PBMC-expressed genes (~1300)

**Caveat: DBS is a challenging context for genome-scale analyses**

Limiting dilution statistical issues (low SNR)

Cross-gene  $r$  = good    Cross-subject  $r$  = variable

2. Correlation with “gold standard” varies across genes

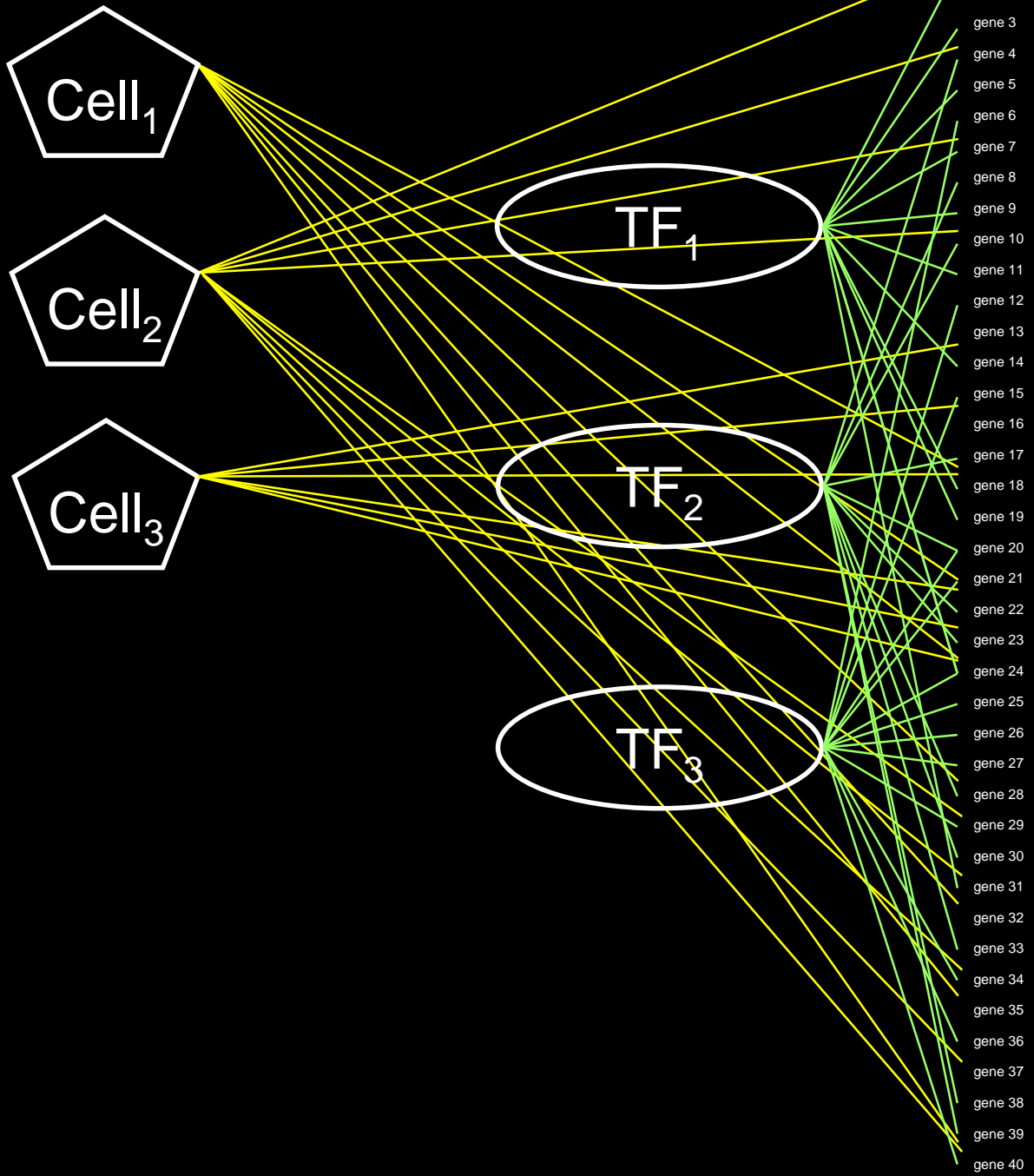
**Highest consistency:** Type I IFN antiviral genes, Monocyte/macrophage, Inflammatory (*IL8*, *PTGS2/COX2*, *SOD2*), Regulatory cytokines (*IL10*)  
Variability driven largely by “true transcript variance”

3. Specific assay approaches & vendors

Similar in abstract: very different in practice

**NuGEN:** slightly better quantitative performance

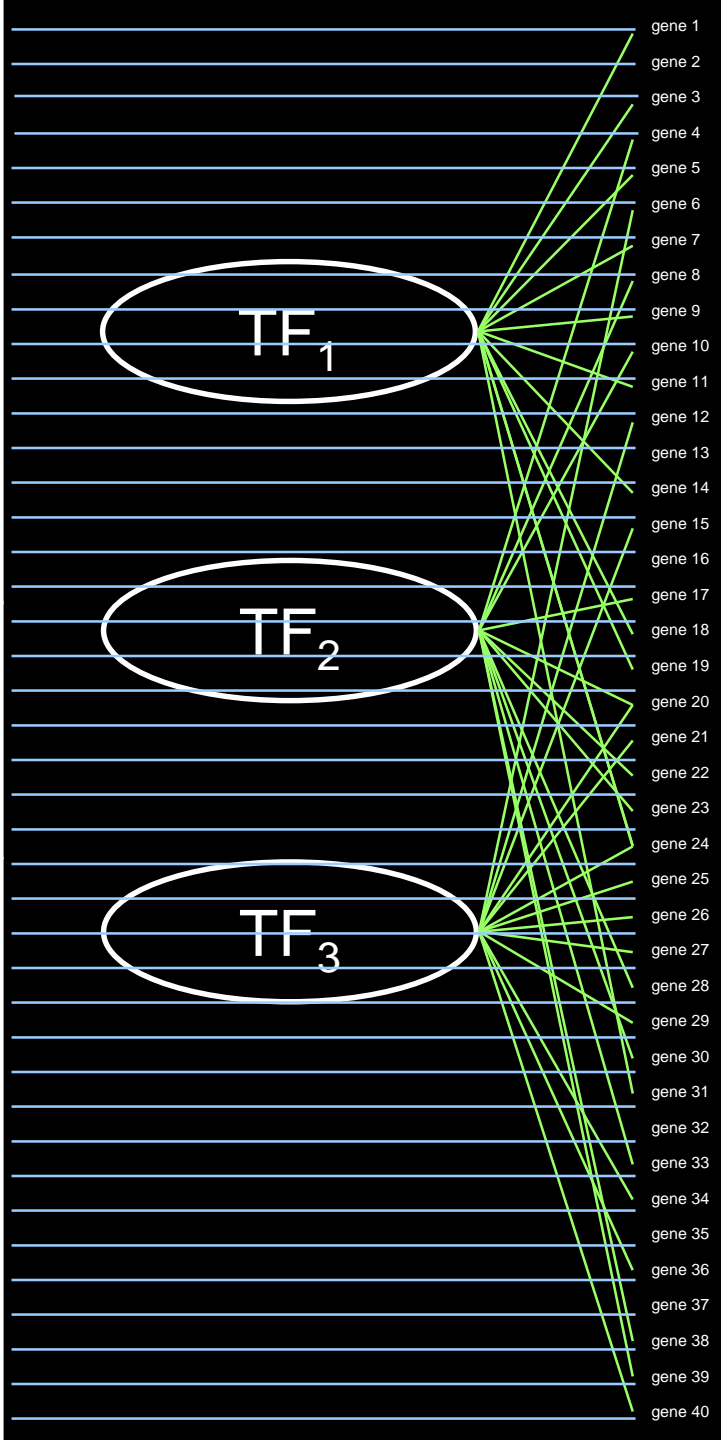
MUCH better yield of immunologically interpretable genes



Chr1.1

Chr1.2

Chr1.3



gene 1

gene 2

gene 3

gene 4

gene 5

gene 6

gene 7

gene 8

gene 9

gene 10

gene 11

gene 12

gene 13

gene 14

gene 15

gene 16

gene 17

gene 18

gene 19

gene 20

gene 21

gene 22

gene 23

gene 24

gene 25

gene 26

gene 27

gene 28

gene 29

gene 30

gene 31

gene 32

gene 33

gene 34

gene 35

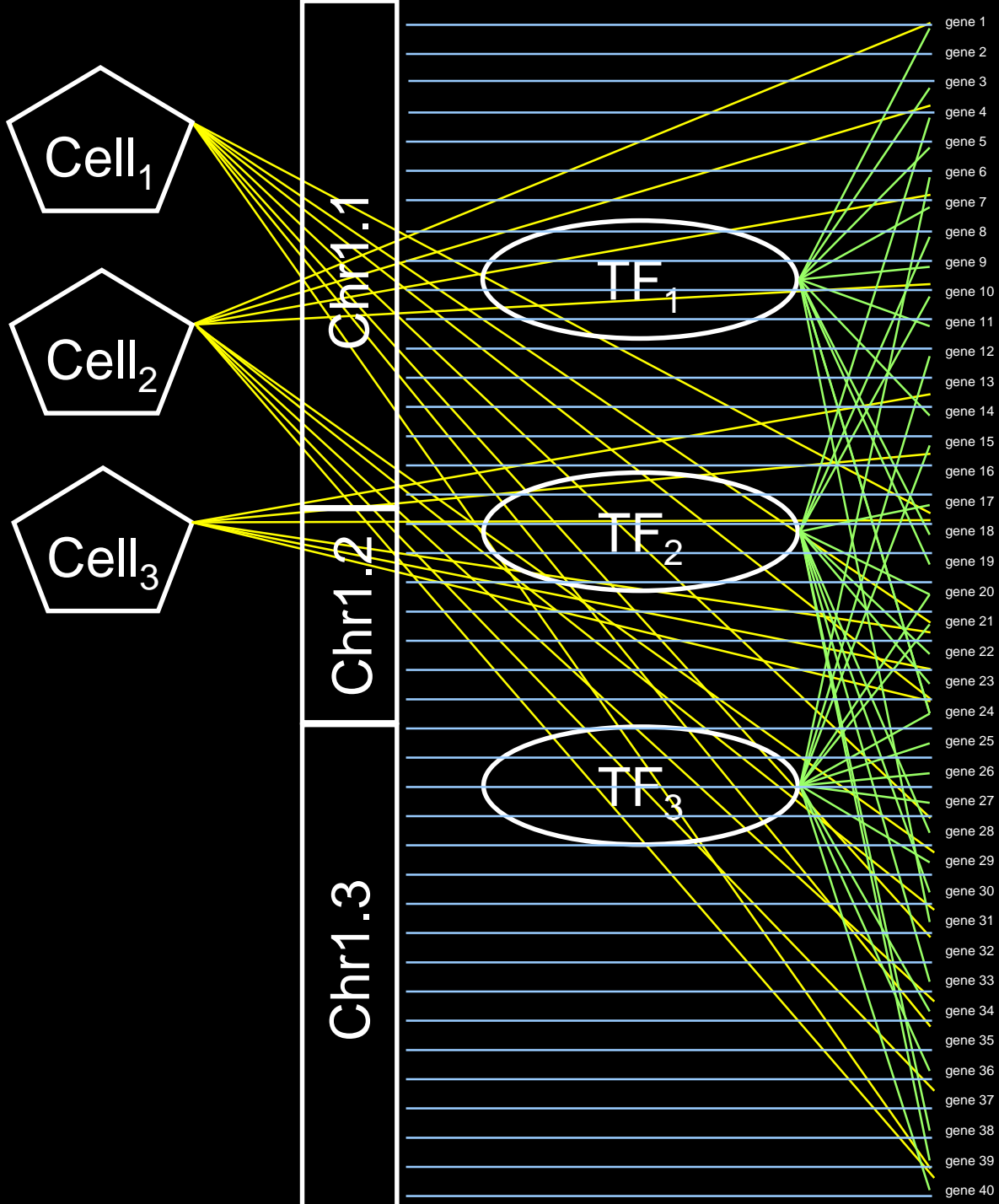
gene 36

gene 37

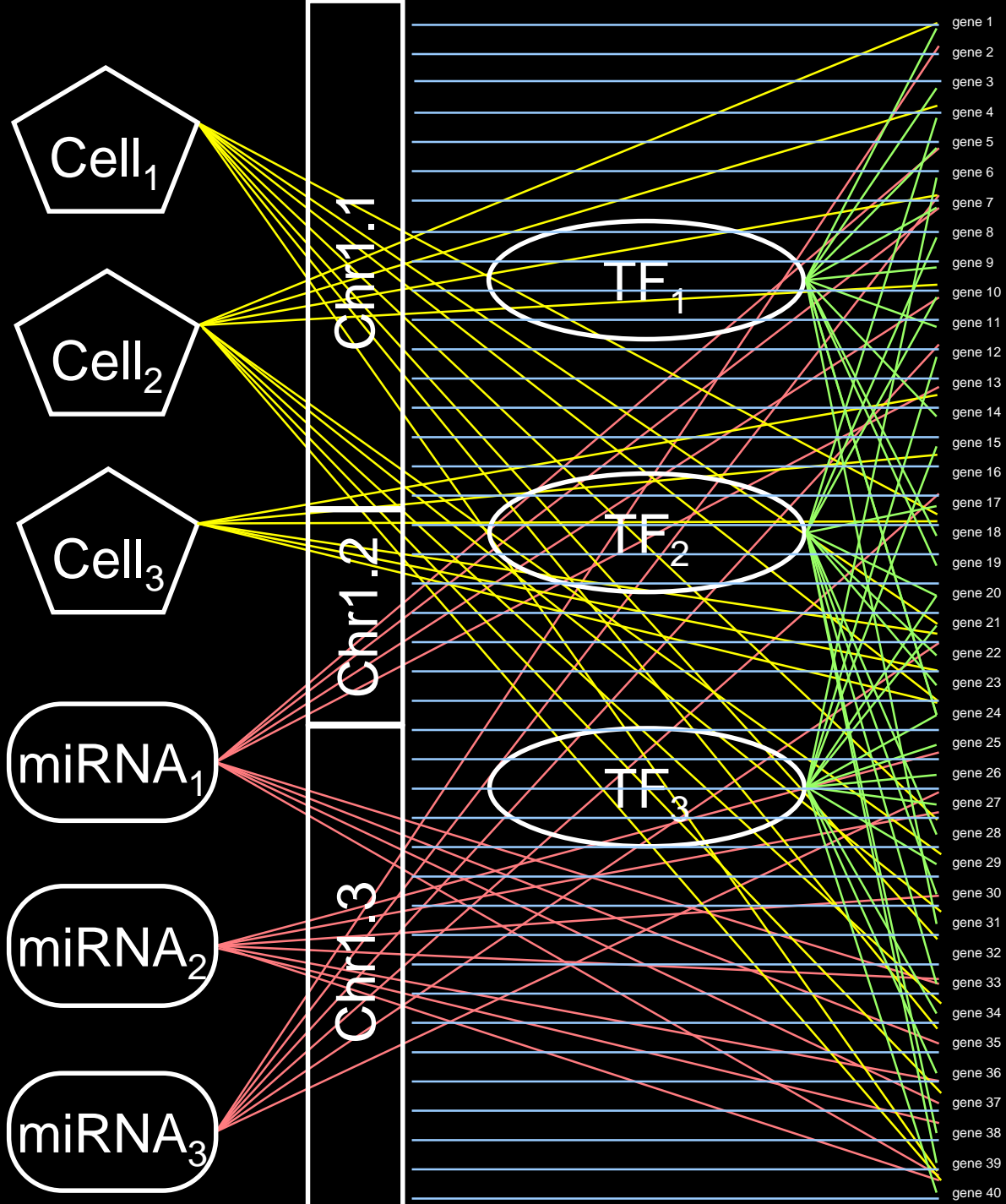
gene 38

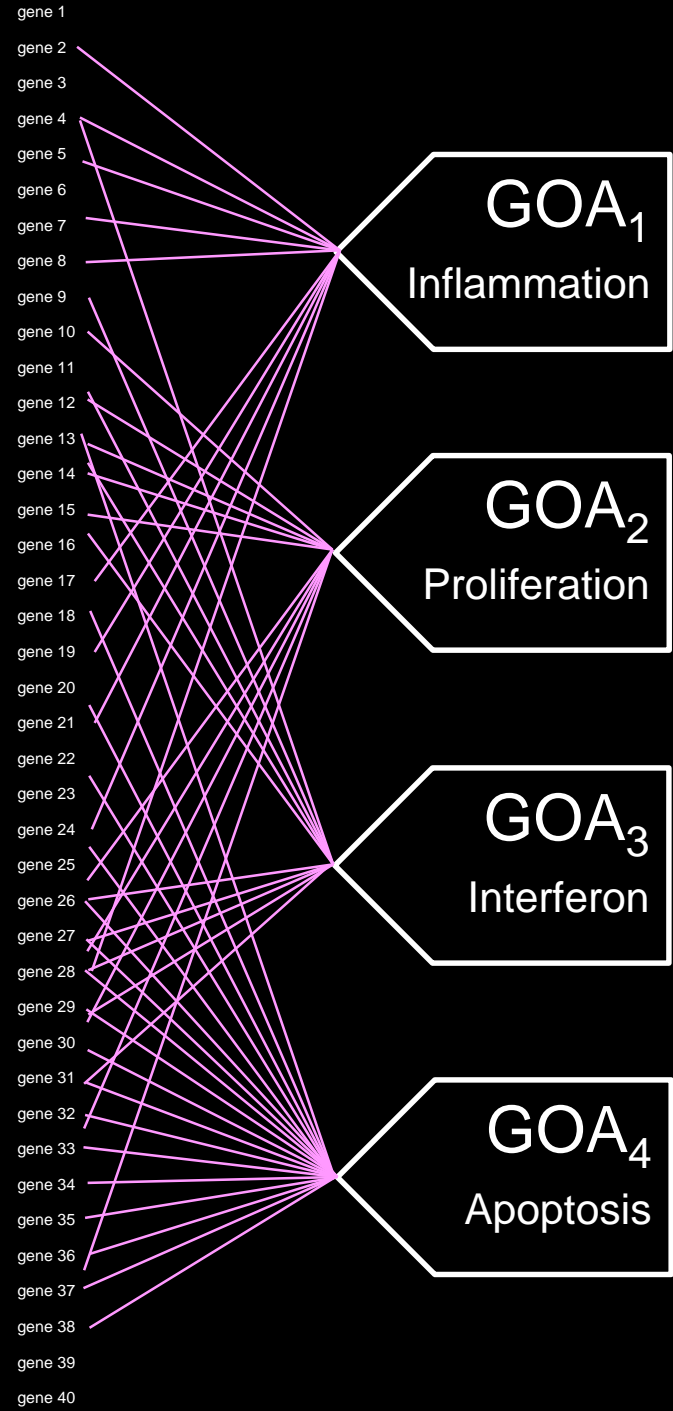
gene 39

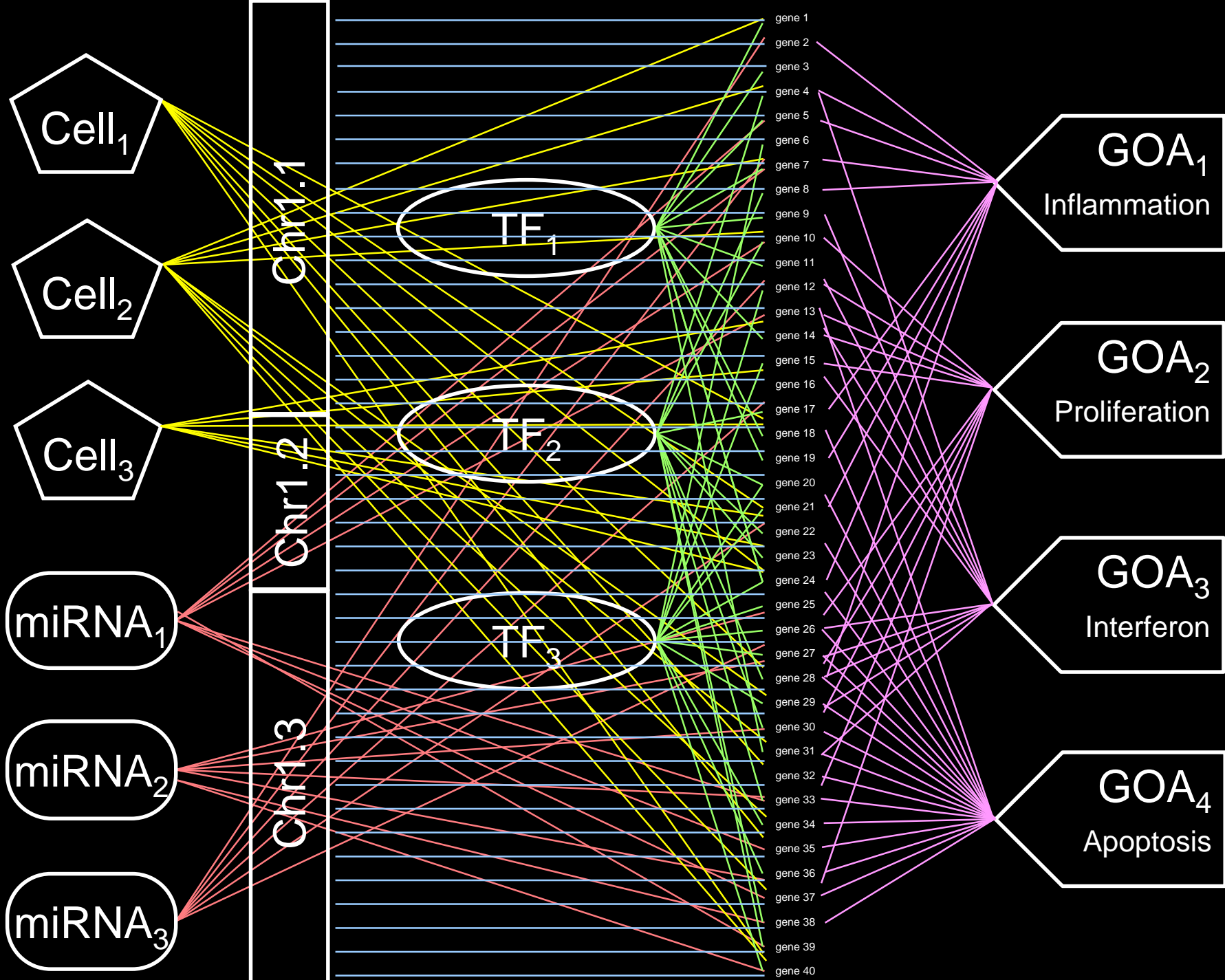
gene 40

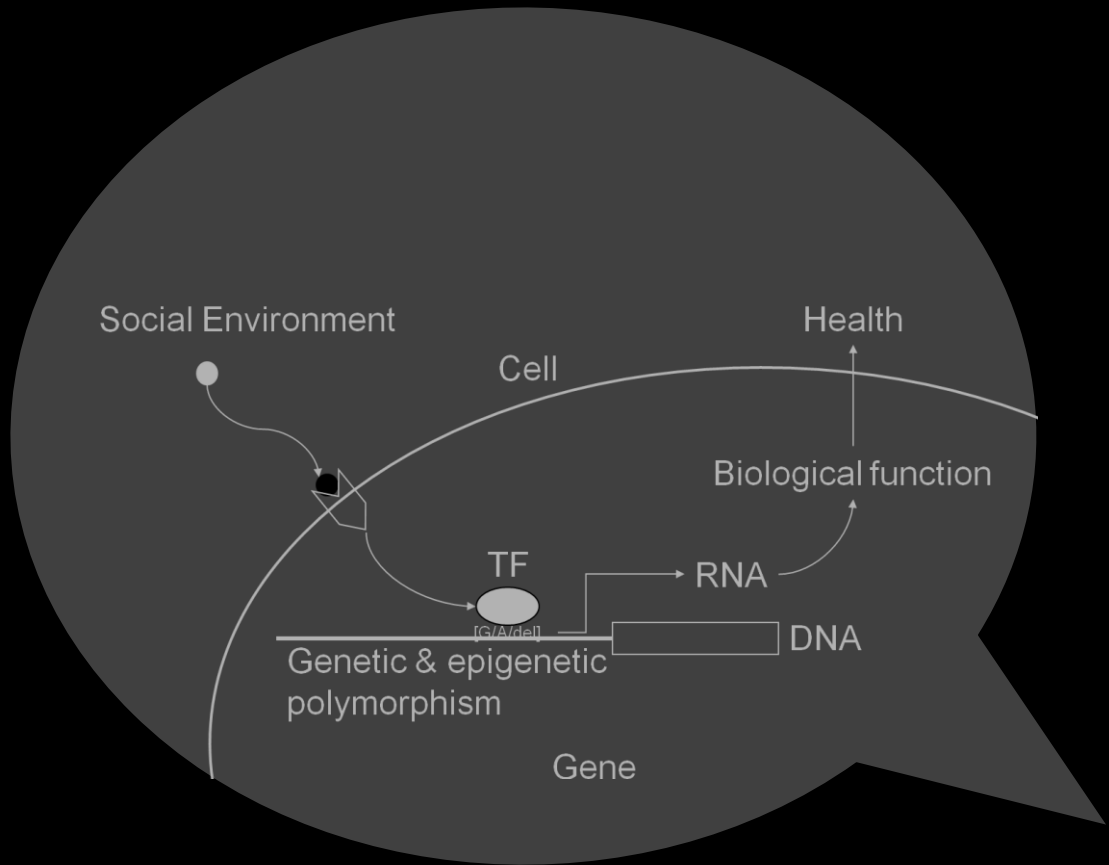












- gene 1
- gene 2
- gene 3
- gene 4
- gene 5
- gene 6
- gene 7
- gene 8
- gene 9
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- gene 40



