

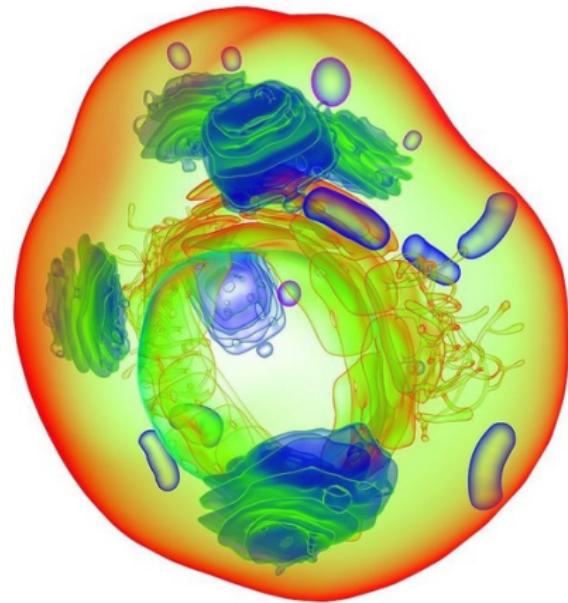
# Modelling single-cell dynamics with trajectories and gene regulatory networks

Robrecht Cannoodt

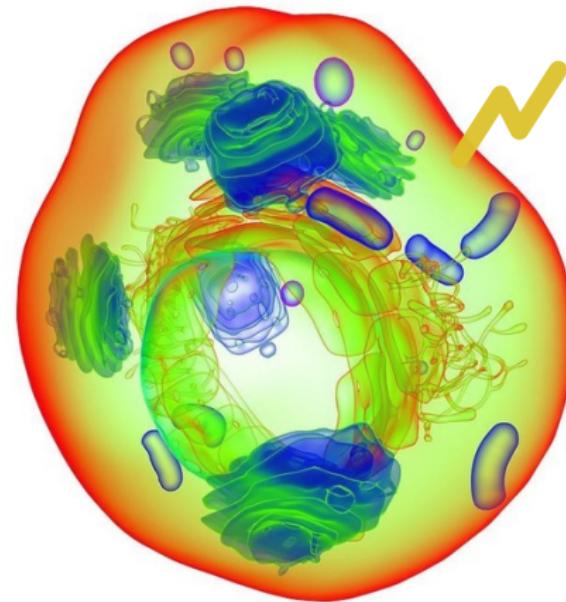
16 december 2019



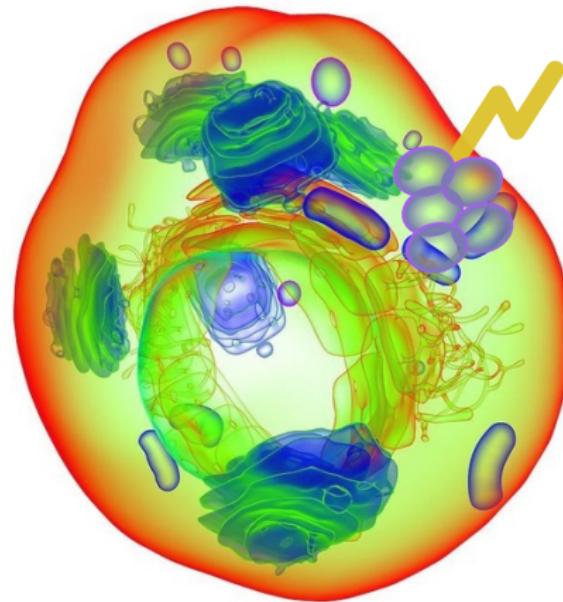
Cellen zijn dynamisch



# Cellen zijn dynamisch

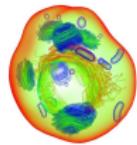


# Cellen zijn dynamisch



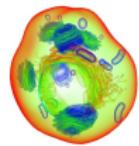
# Hoe maken cellen eiwitten aan?

Cel

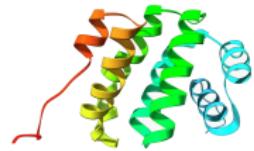


# Hoe maken cellen eiwitten aan?

Cel

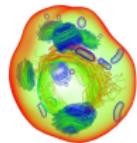


Eiwit

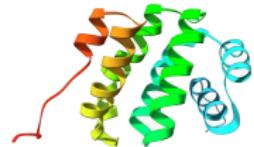


# Hoe maken cellen eiwitten aan?

Cel



Eiwit



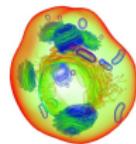
Restaurant



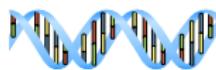
Sushi

# Hoe maken cellen eiwitten aan?

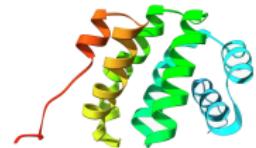
Cel



DNA



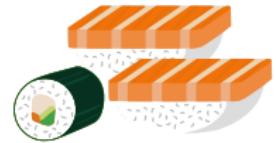
Eiwit



Restaurant



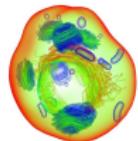
Kookboek



Sushi

# Hoe maken cellen eiwitten aan?

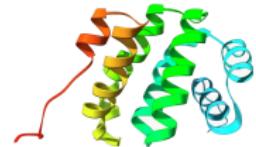
Cel



DNA



Eiwit



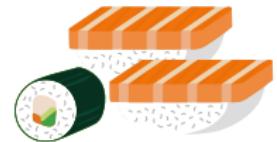
Recept



Restaurant



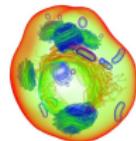
Kookboek



Sushi

# Hoe maken cellen eiwitten aan?

Cel



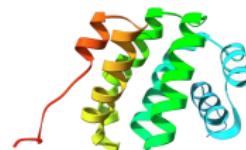
DNA



RNA



Eiwit



Cel



Recept



Restaurant

Kookboek

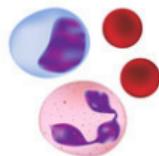
Fotokopie  
van recept



Sushi

Restaurant

# Het menselijk lichaam bevat >210 soorten cellen



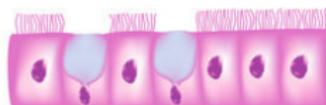
Blood cells



Surface skin cells



Bone cell



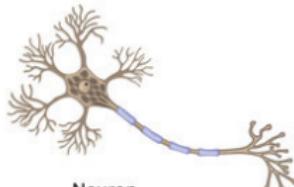
Columnar epithelial and Goblet cells



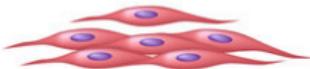
Cardiac muscle cell



Skeletal muscle cells



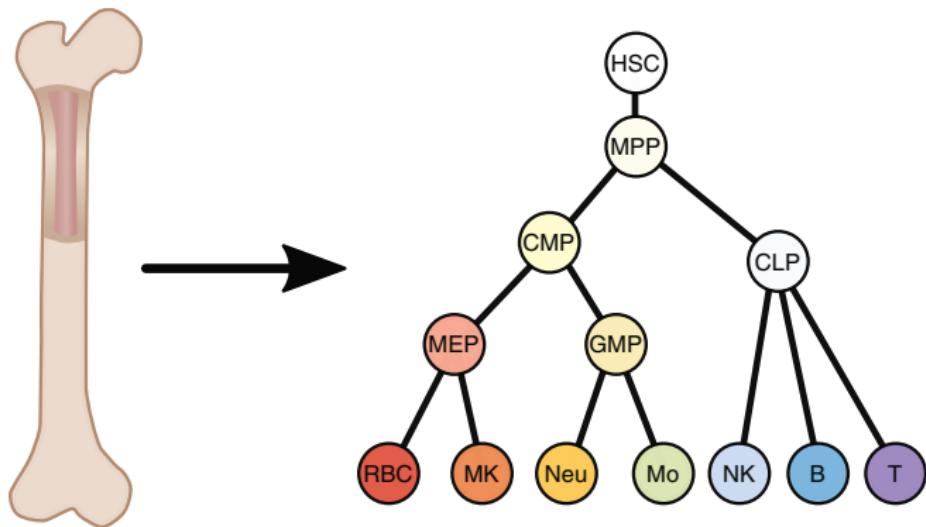
Neuron



Smooth muscle cells

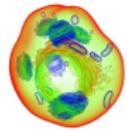
(placeholder figuur)

Cellen kunnen ontwikkelen van één type naar een ander



# Welke types cellen komen voor in een populatie?

Cel



DNA



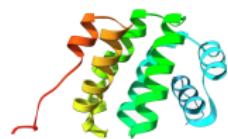
RNA



Aminozuur



Eiwit



Restaurant



Kookboek

Recept



Fotokopie  
van recept

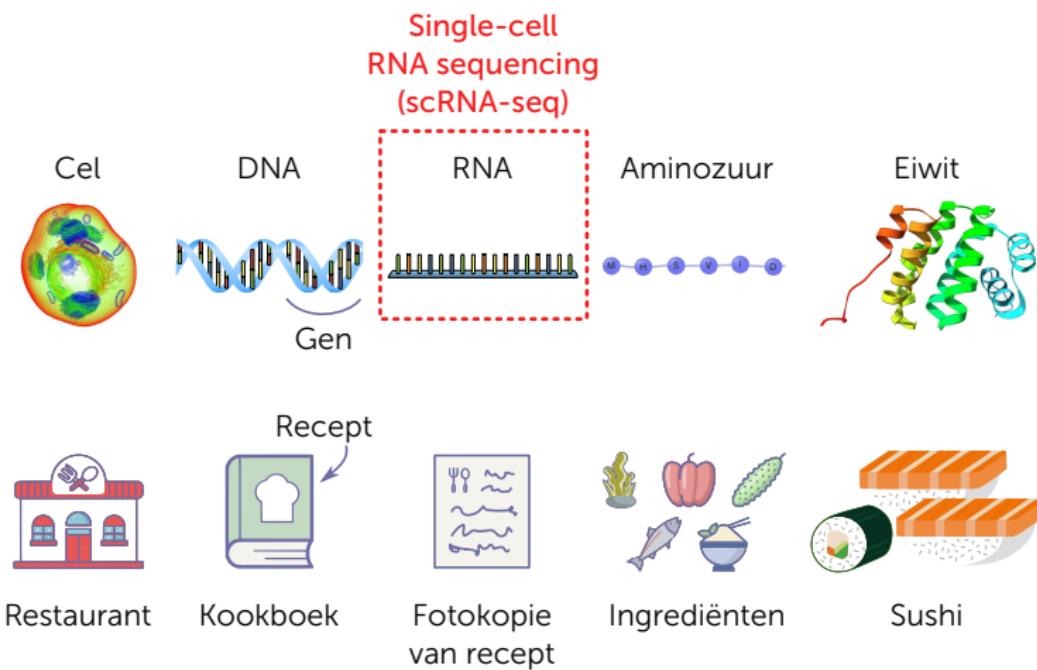


Ingrediënten



Sushi

# Welke types cellen komen voor in een populatie?

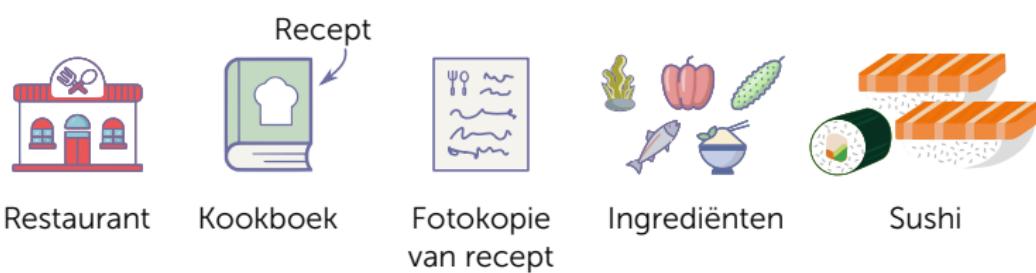
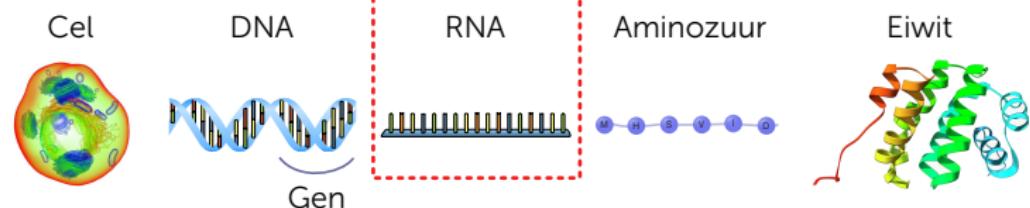


# Welke types cellen komen voor in een populatie?

Wat voor een cel is dit?

Wat is zijn functie?

Single-cell  
RNA sequencing  
(scRNA-seq)



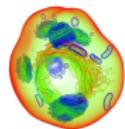
# Welke types cellen komen voor in een populatie?

Wat voor een cel is dit?

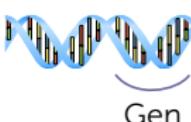
Wat is zijn functie?

Single-cell  
RNA sequencing  
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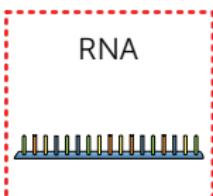
Cel



DNA



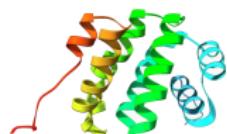
RNA



Aminozuur



Eiwit



Recept



Restaurant



Kookboek



Fotokopie  
van recept



Ingrediënten

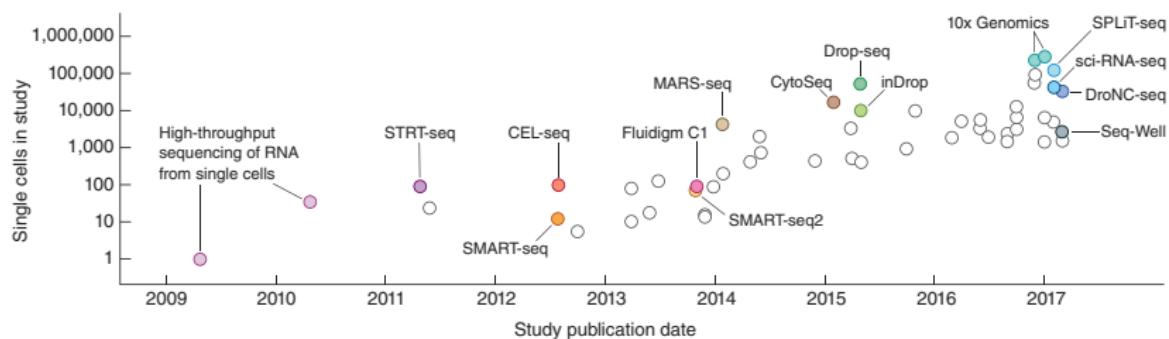
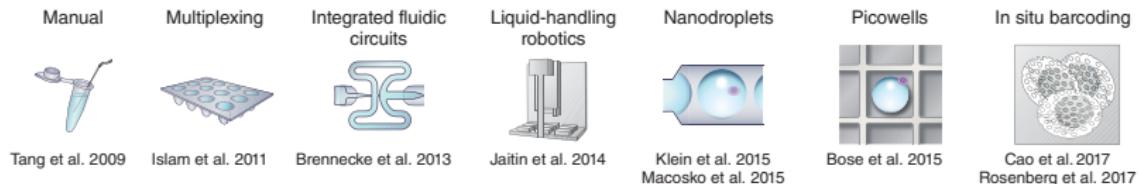


Sushi

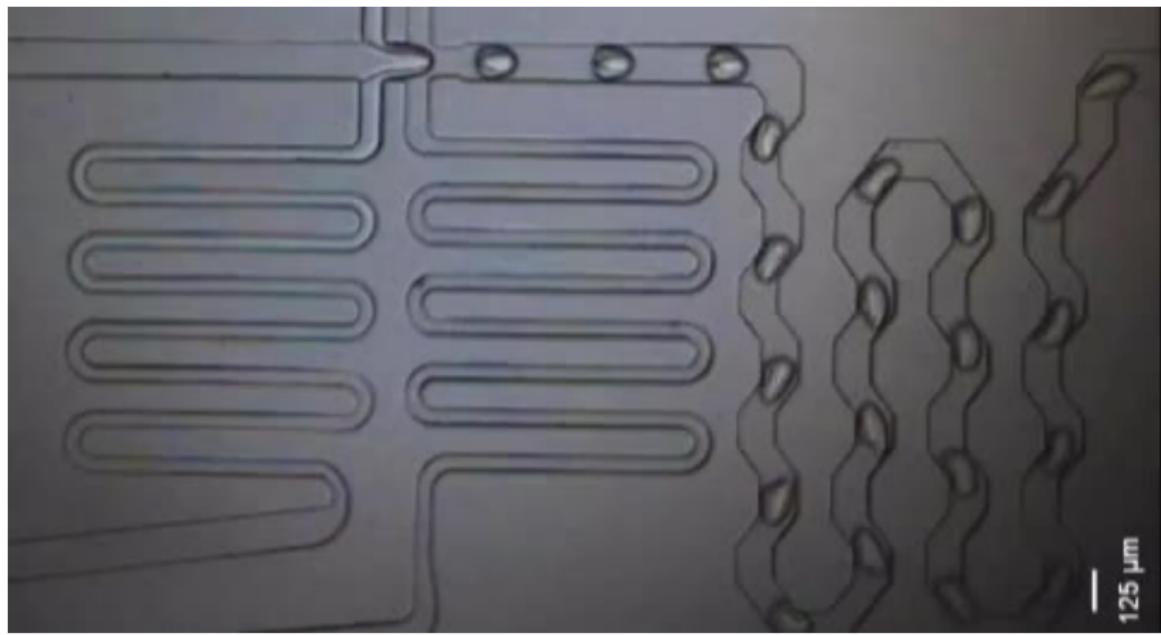
Welk type restaurant is dit?

- Mexikaans, chinees, italiaans, ...
- À la carte, all you can eat, drivethrough
- Hoeveel sterren op yelp?

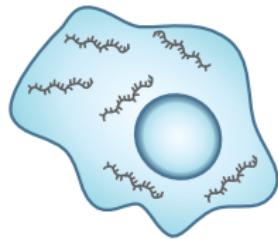
# 2014: doorbraak in schaalbaarheid van scRNA-seq



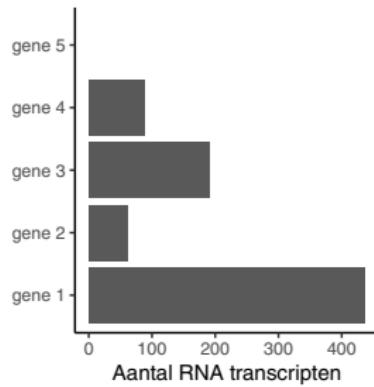
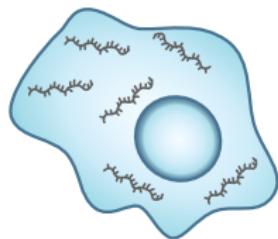
## Voorbeeld van een scRNA-seq technologie: Drop-seq



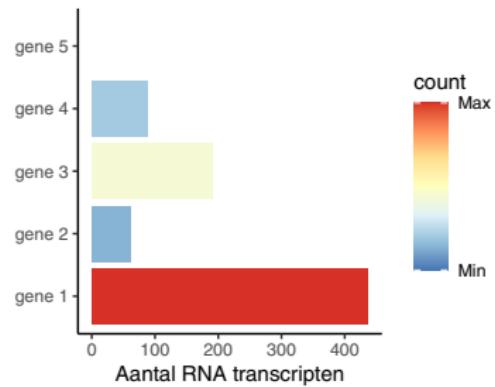
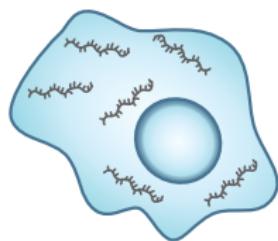
# Moleculen tellen met scRNA-seq



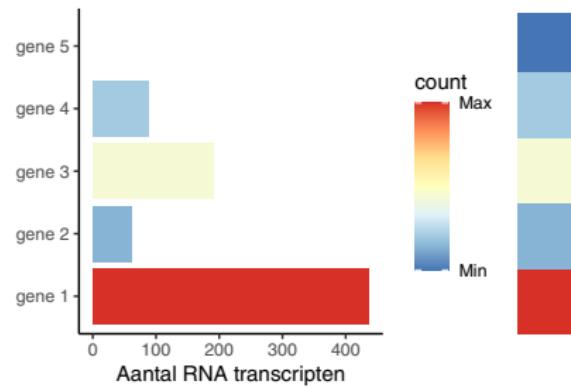
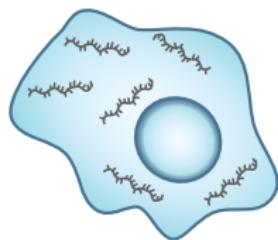
# Moleculen tellen met scRNA-seq



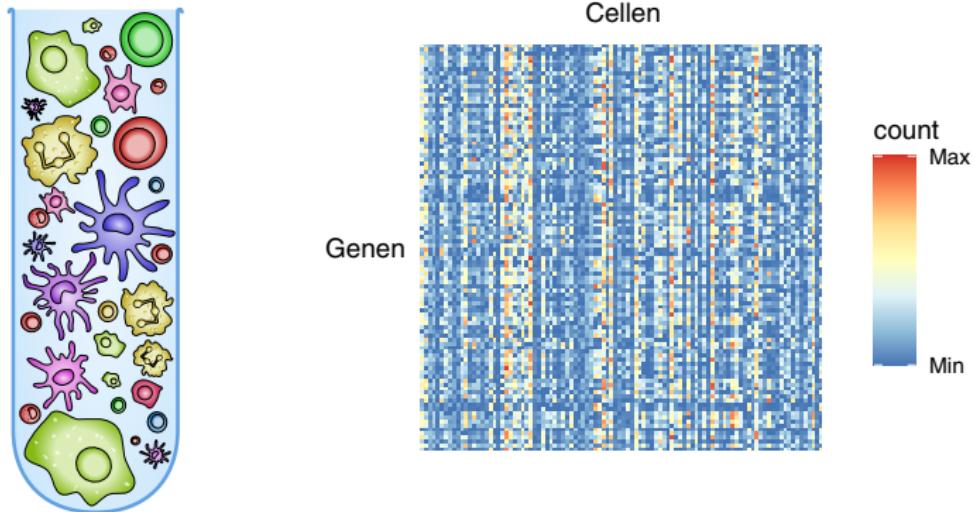
# Moleculen tellen met scRNA-seq



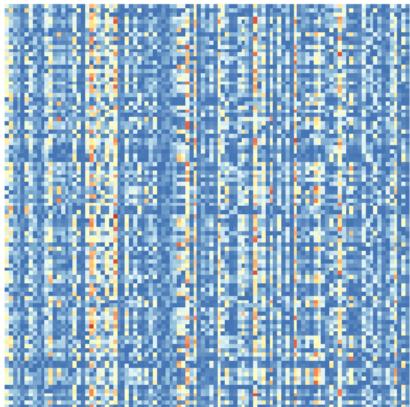
# Moleculen tellen met scRNA-seq



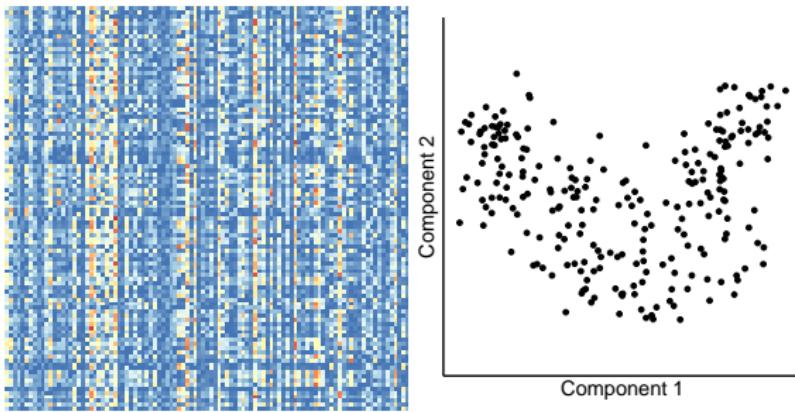
# Moleculen tellen met scRNA-seq



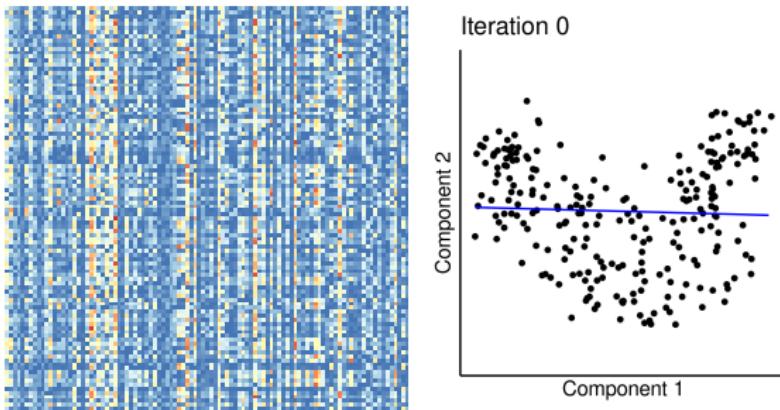
# Cellen ordenen met SCORPIUS



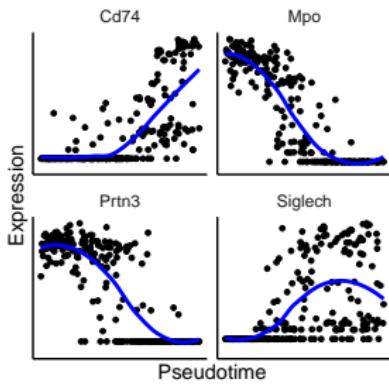
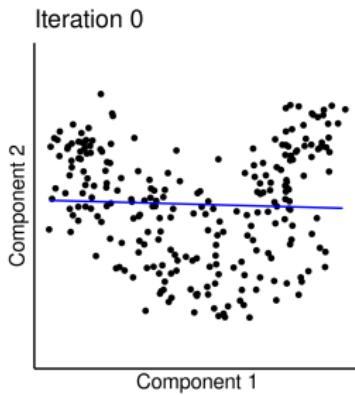
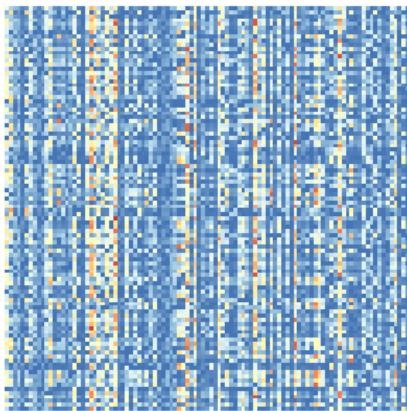
# Cellen ordenen met SCORPIUS



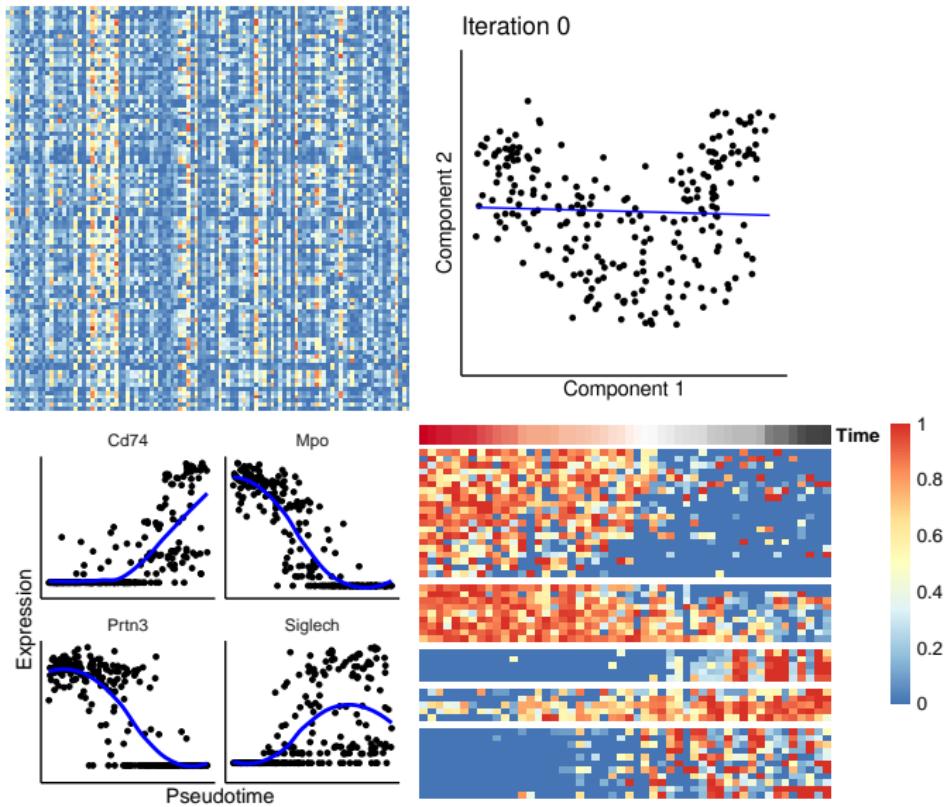
# Cellen ordenen met SCORPIUS



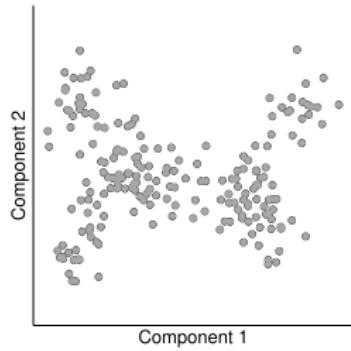
# Cellen ordenen met SCORPIUS



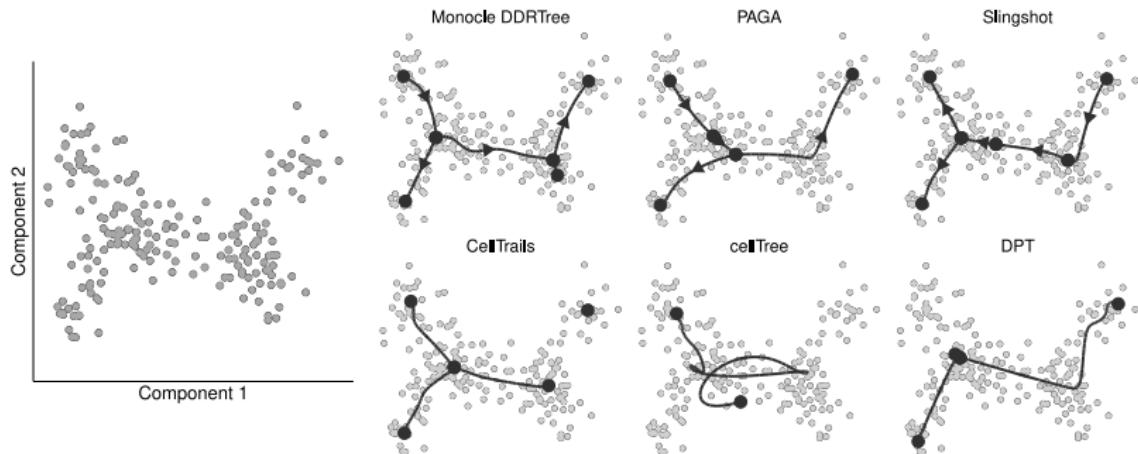
# Cellen ordenen met SCORPIUS



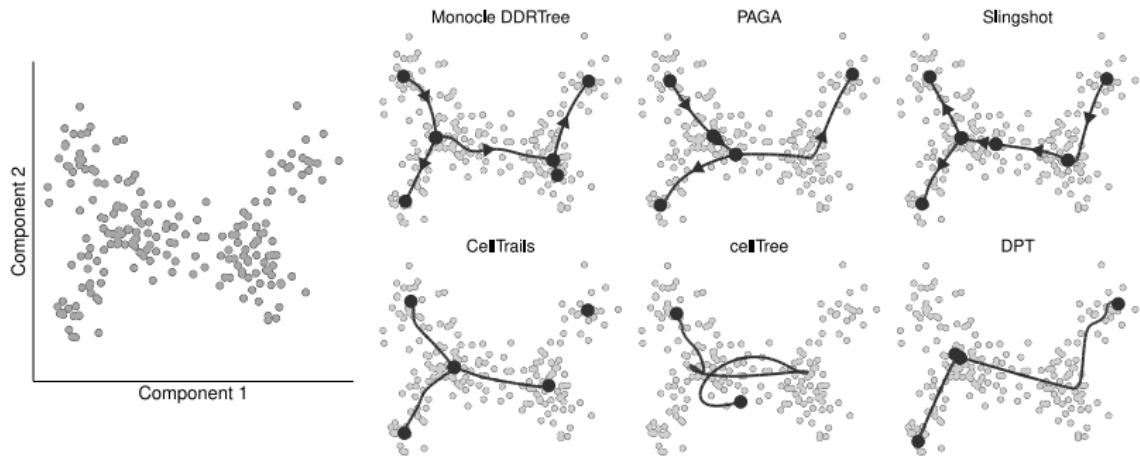
Niet alle datasets zijn even gemakkelijk



# Niet alle datasets zijn even gemakkelijk

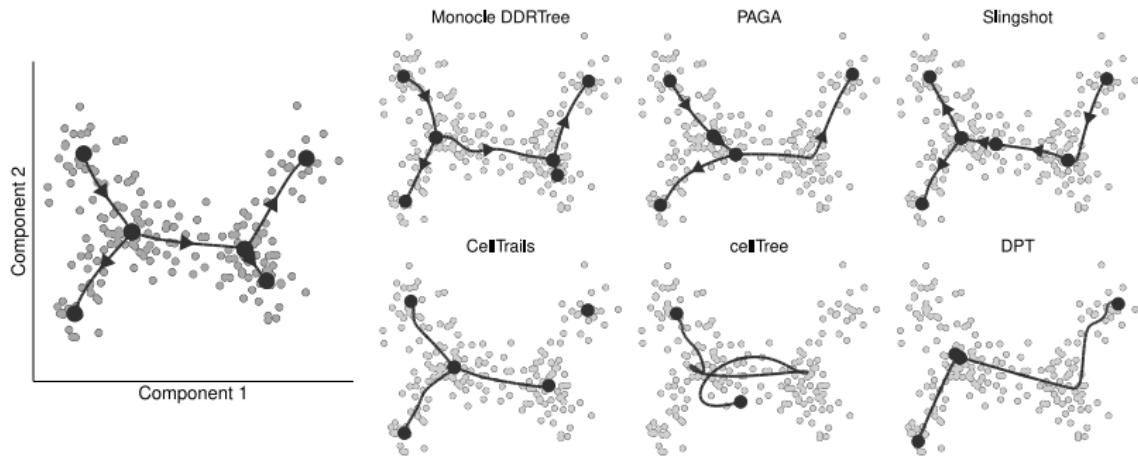


# Niet alle datasets zijn even gemakkelijk



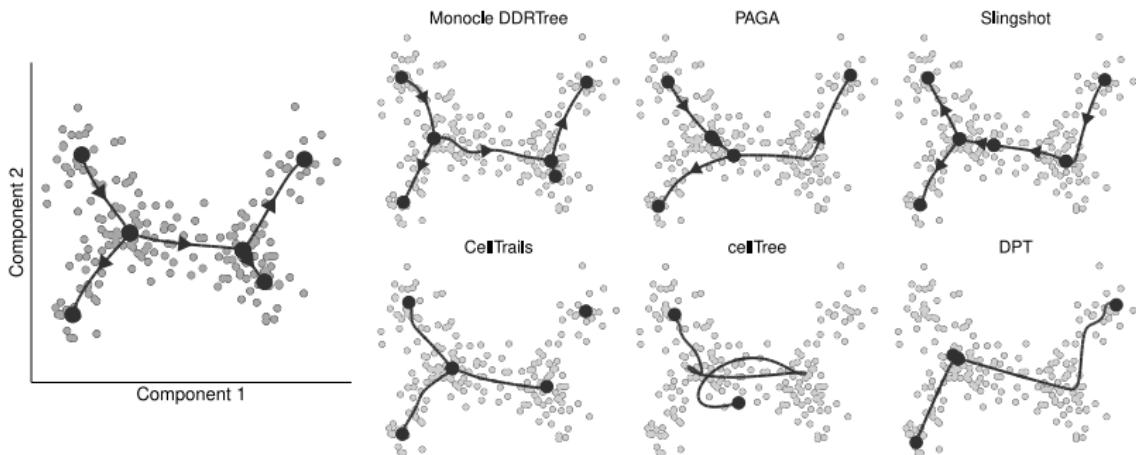
Trajectory inference; >70 methoden

# Niet alle datasets zijn even gemakkelijk



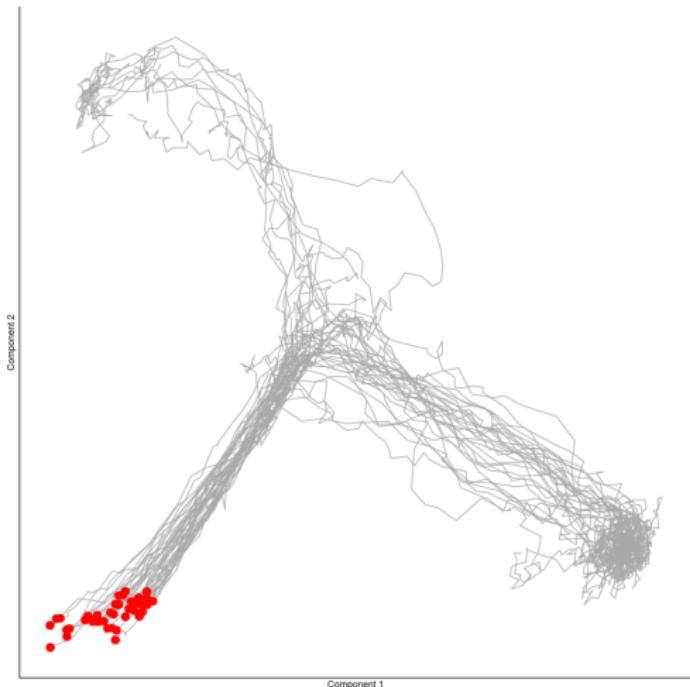
Trajectory inference; >70 methoden

# Niet alle datasets zijn even gemakkelijk

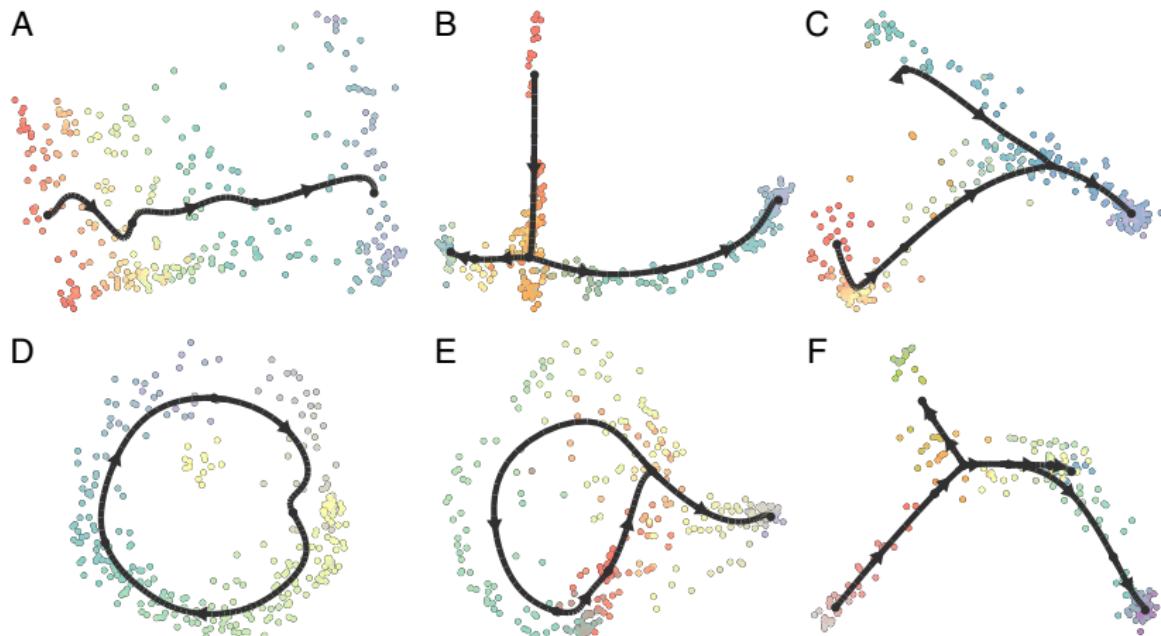


Trajectory inference; >70 methoden  
Nood aan een vergelijking van methoden

# Simulatie van virtuele cellen



# Simulatie van virtuele cellen



# Resultaten benchmark

# Guidelines

# Conclusies benchmark paper

# Toekomstvisie

- Werk Helena rond GNG (toon filmpje)
- Trajectory alignment
- Combinatie met spatial omics
- Human Cell Atlas (vergelijk met de human genome project)