

SITC 2019

Gaylord National Hotel
& Convention Center

Nov. 6-10

NATIONAL HARBOR, MARYLAND



Society for Immunotherapy of Cancer



There are no relevant disclosures to the presentation.



Spatial transcriptomics

Itai Yanai

Institute for Computational Medicine

NYU School of Medicine



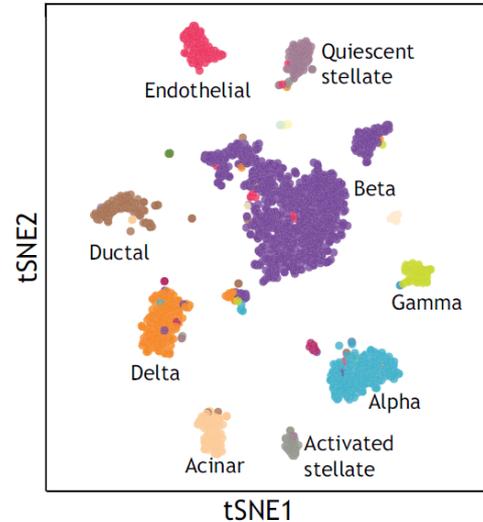
Society for Immunotherapy of Cancer

#SITC2019

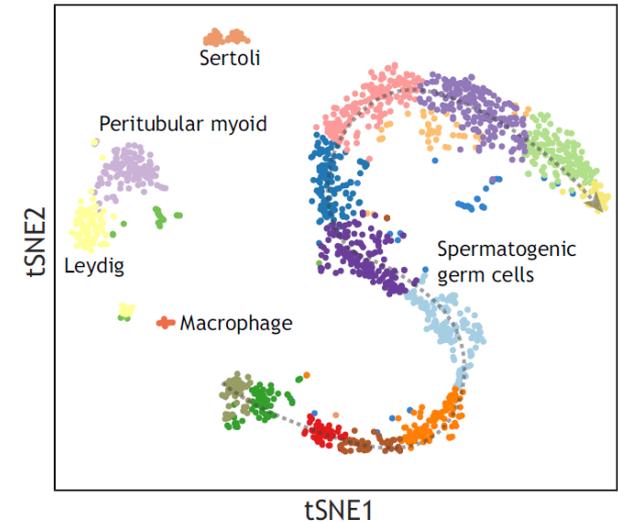
Historical and scRNA-Seq approaches to identifying cell types

Identification of cell types through:	
Morphology	Function
 Schwann cell	 Macrophage
 Purkinje cell	 β cell
 Sertoli cell	 Spermatozoon
 Astrocyte	 T cell
 Red blood cell	 Neural stem cell

CEL-Seq and CEL-Seq2
Hashimshony *et al.* (2012,2016)
used by the inDrop platform

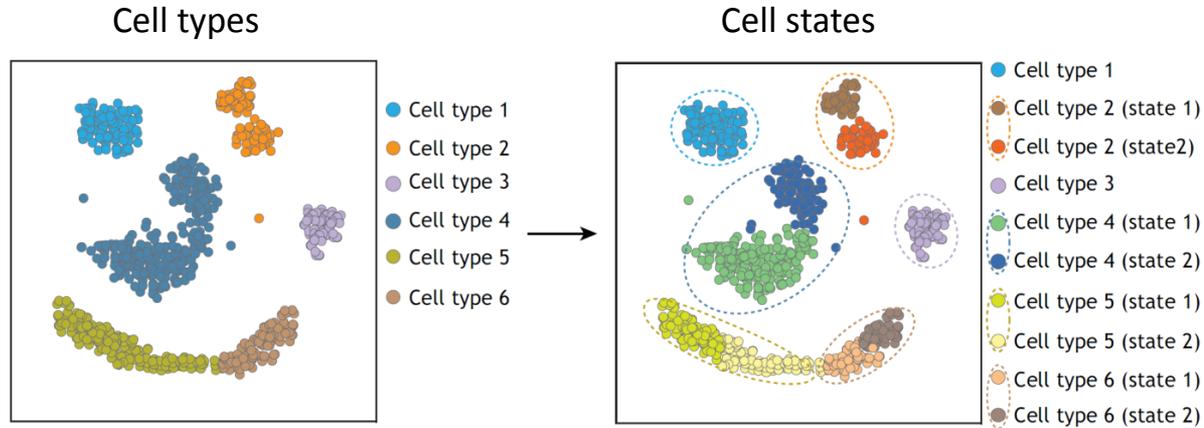


Pancreas
Baron *et al.* *Cell Systems* 2016

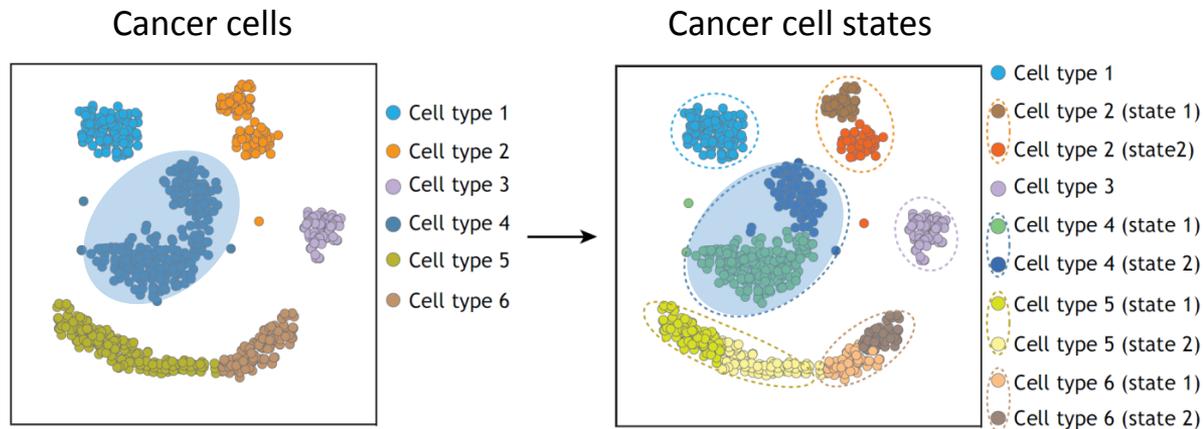


Spermatogenesis
Xia *et al.* *Cell* 2019 (in press)

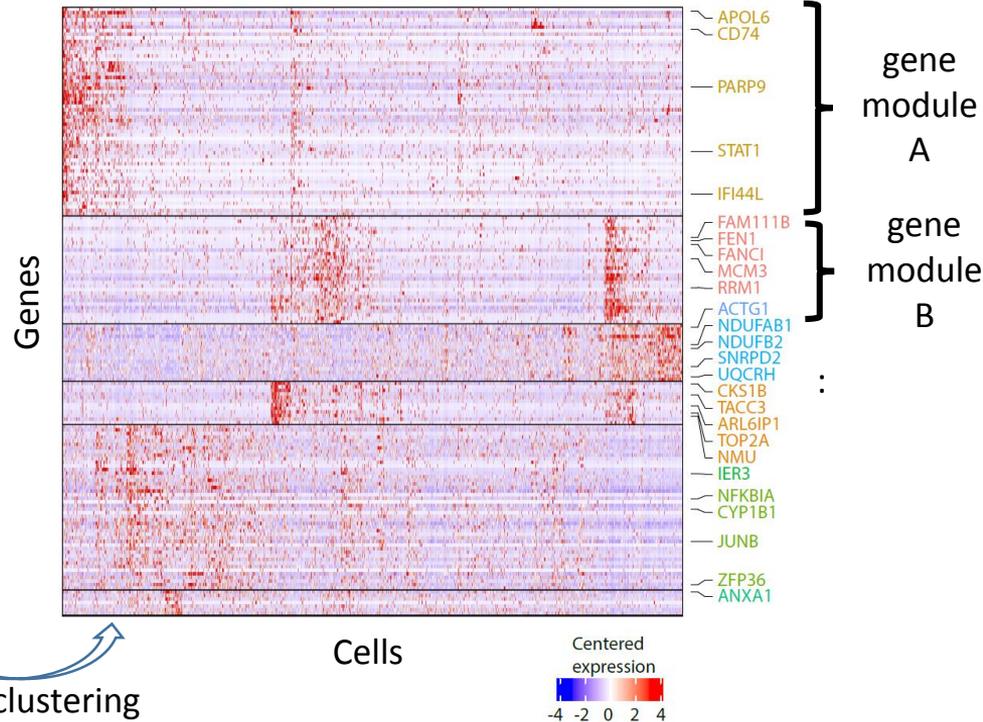
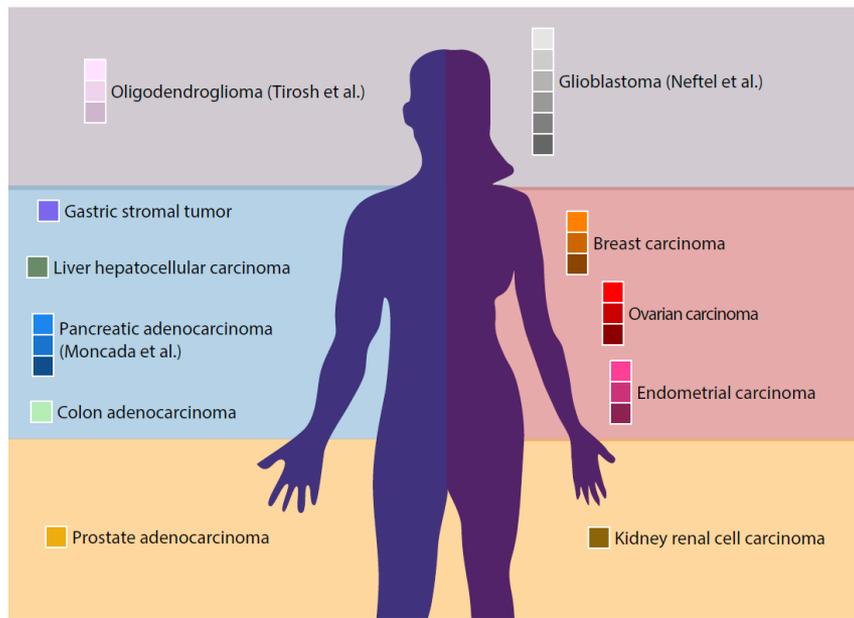
Distinguishing cell types and cell states



Distinguishing cancer cell states

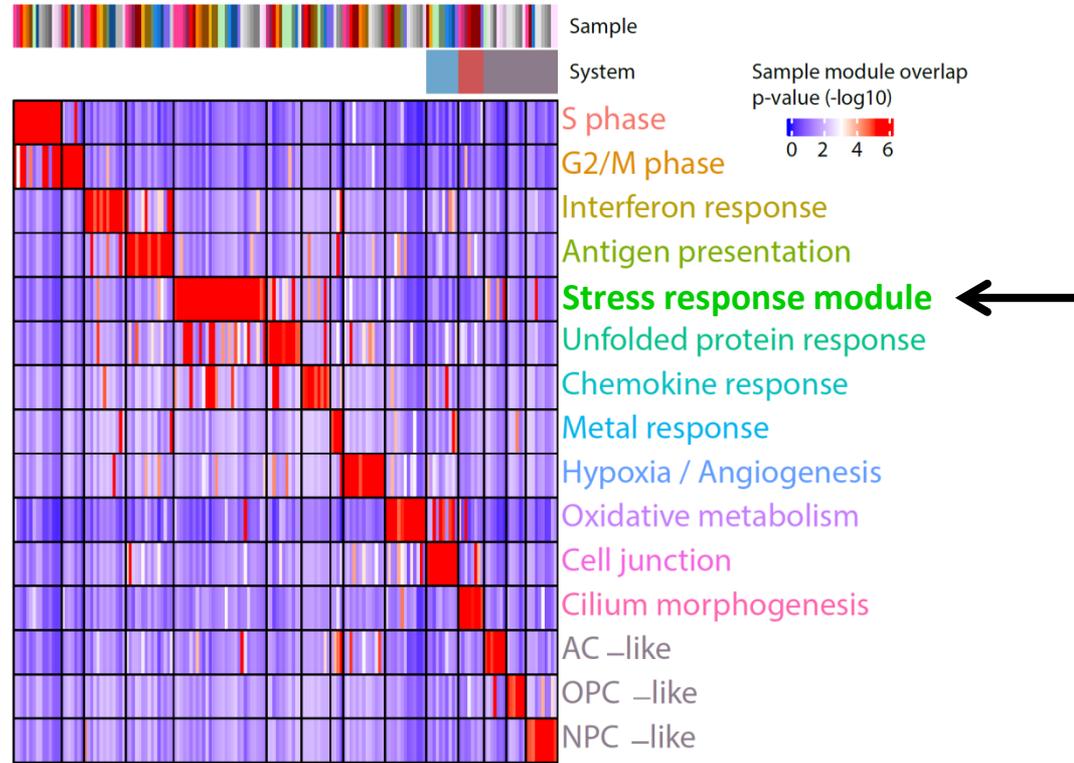
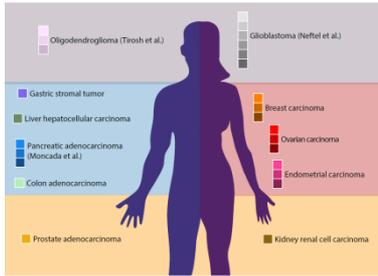


We studied 24 tumors of different cancer types and used scRNA-Seq to detect gene modules

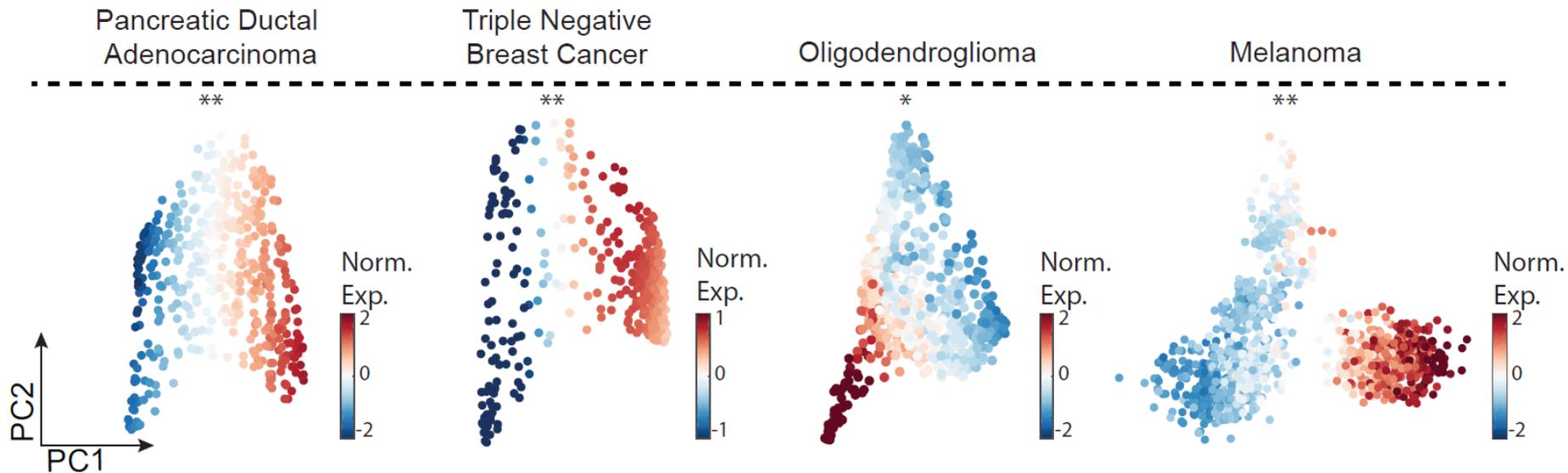


NMF clustering

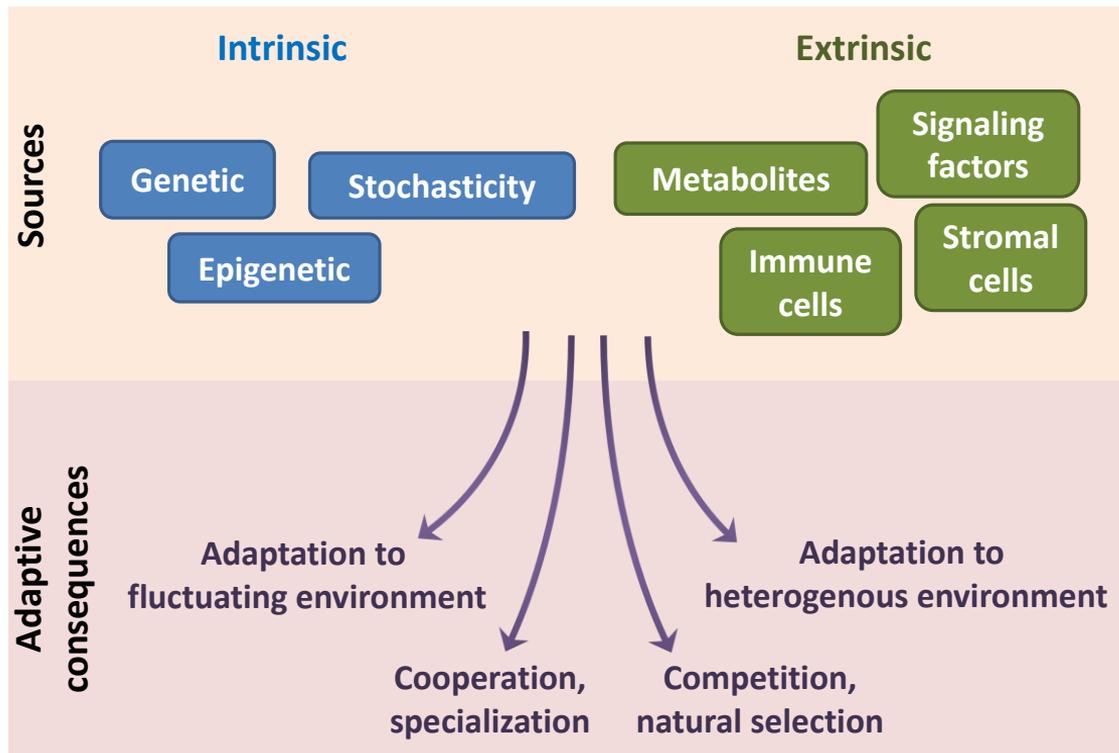
Universal and specific cancer gene modules



A state expressing the stress module across cancer types

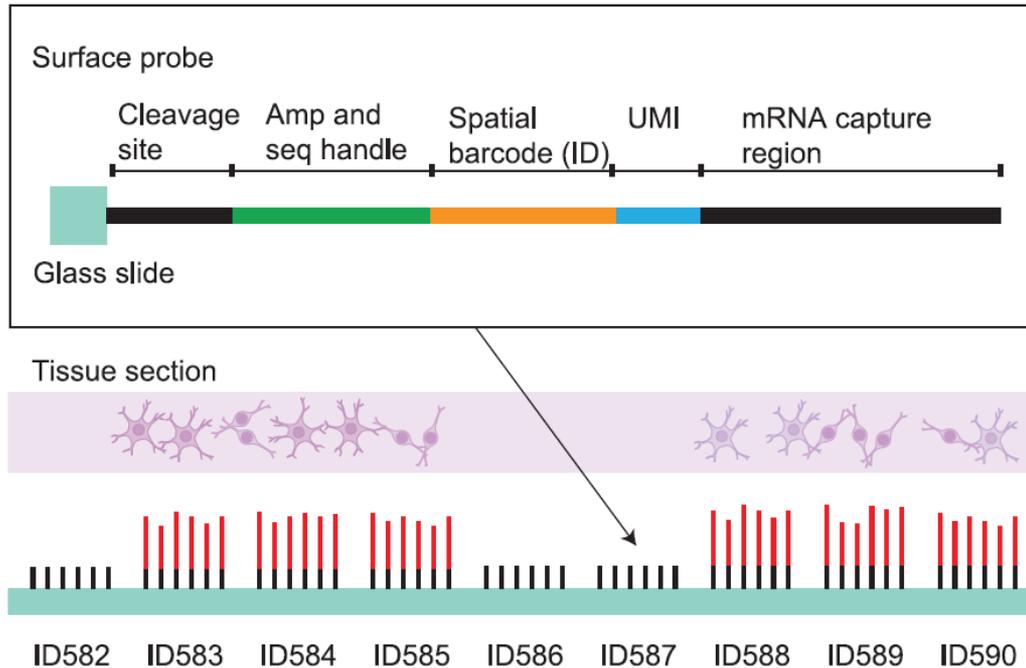


What are the roles of cancer cell states in tumorigenesis?



Barkley & Yanai. *Trends in Cancer* 2019

Spatial transcriptomics

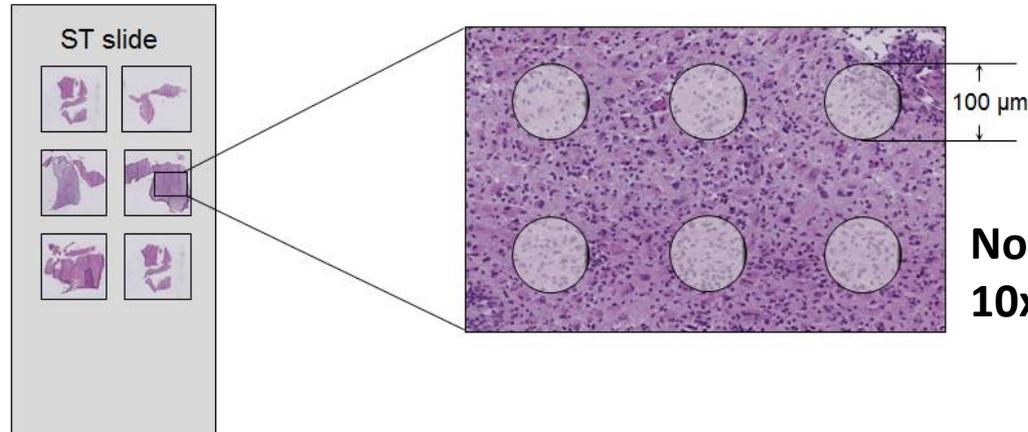
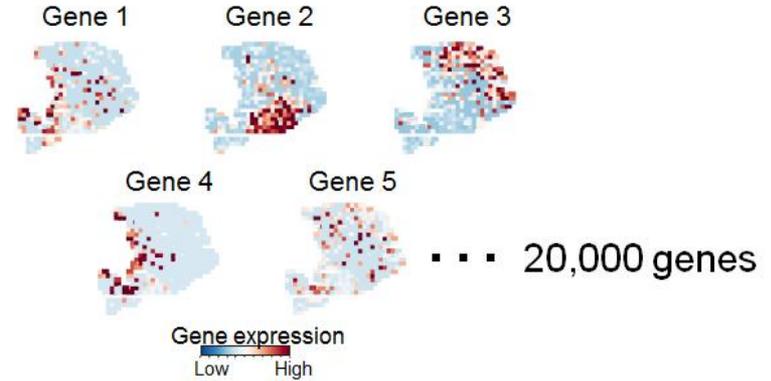
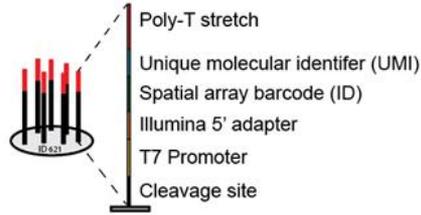
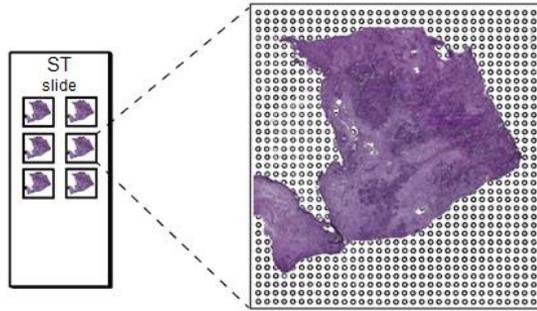


Visualization and analysis of gene expression in tissue sections by spatial transcriptomics

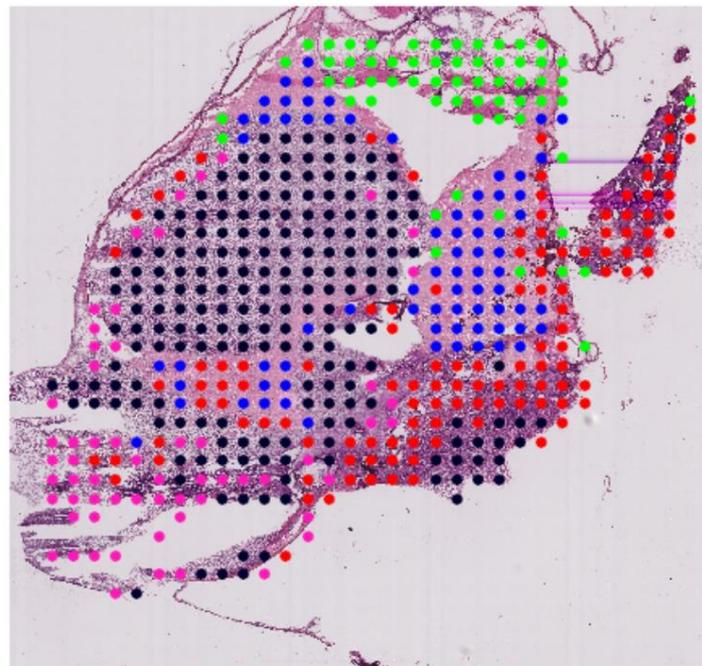
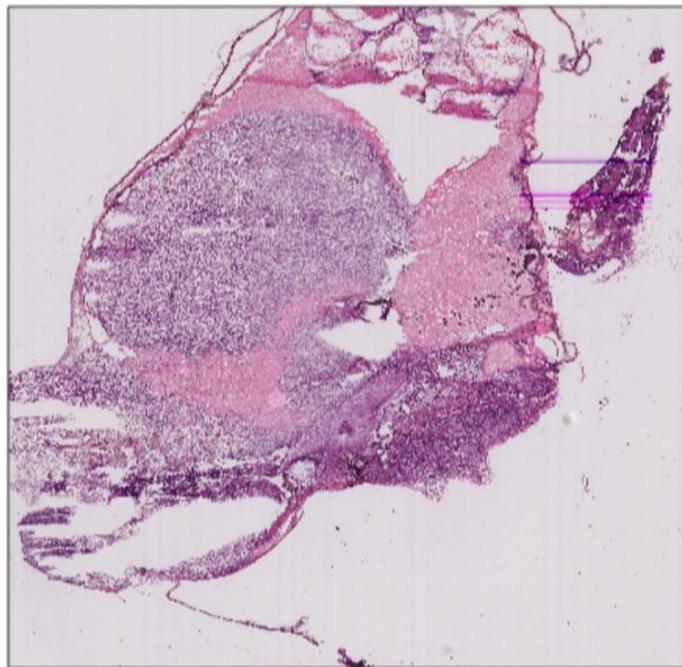
Patrik L. Ståhl,^{1,2*} Fredrik Salmén,^{2*} Sanja Vickovic,^{2,†} Anna Lundmark,^{2,3,†} José Fernández Navarro,^{1,2} Jens Magnusson,¹ Stefania Giacomello,² Michaela Asp,² Jakob O. Westholm,⁴ Mikael Huss,⁴ Annelie Mollbrink,² Sten Linnarsson,⁵ Simone Codeluppi,^{5,6} Åke Borg,⁷ Fredrik Pontén,⁸ Paul Igor Costea,² Pelin Sahlén,² Jan Mulder,⁹ Olaf Bergmann,¹ Joakim Lundeberg,^{2,†} Jonas Frisén¹

Stahl et al. *Science* 2016

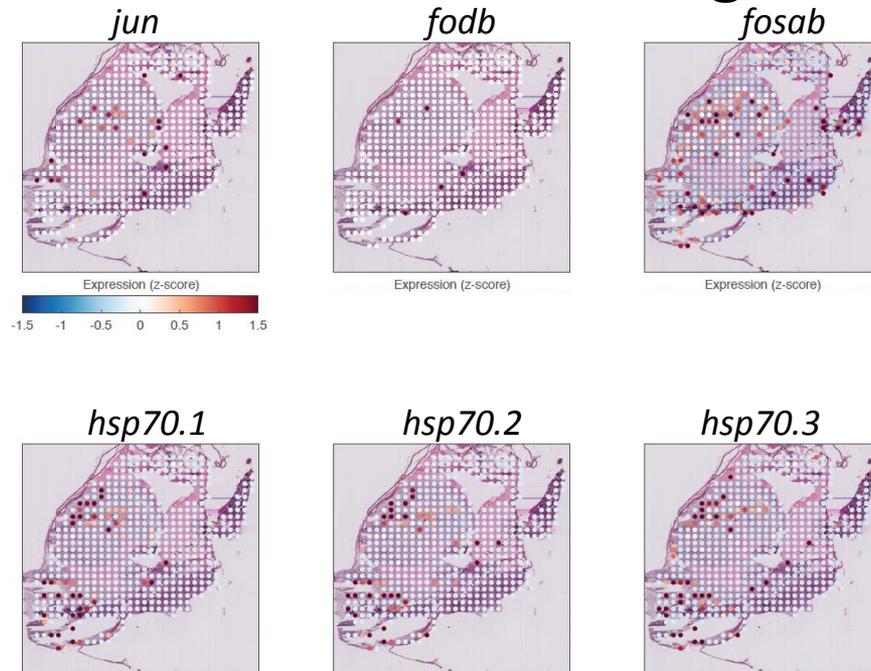
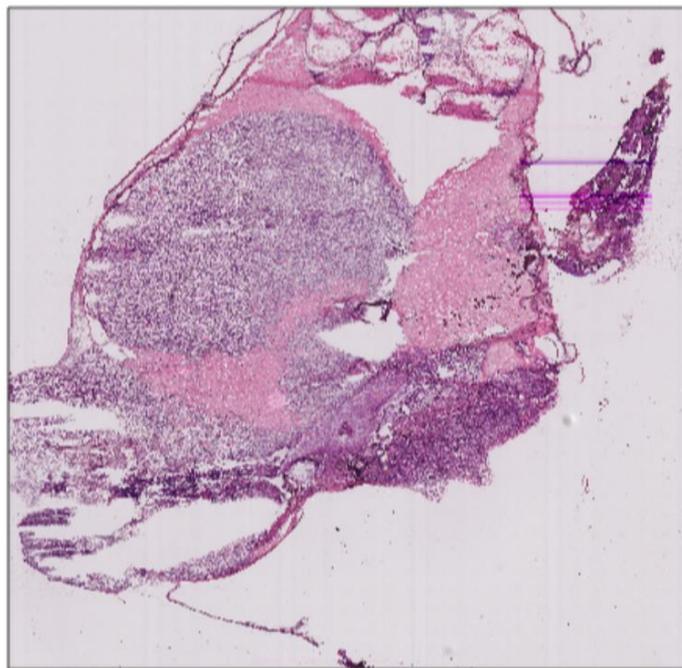
Spatial transcriptomics



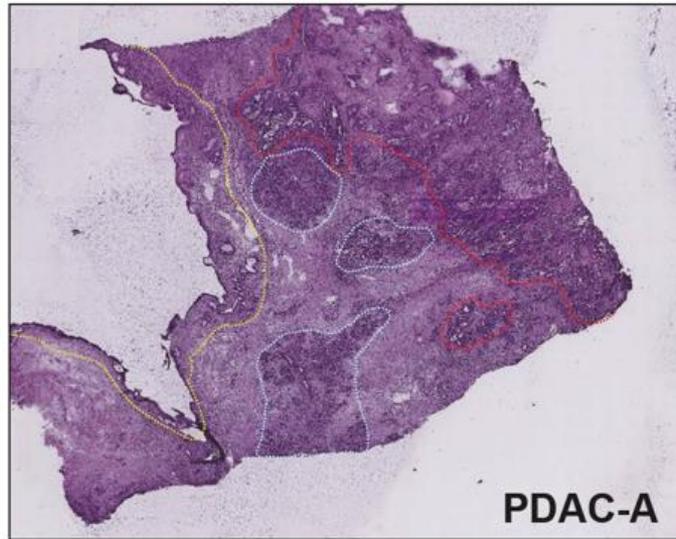
Spatial transcriptomics on a melanoma tumor



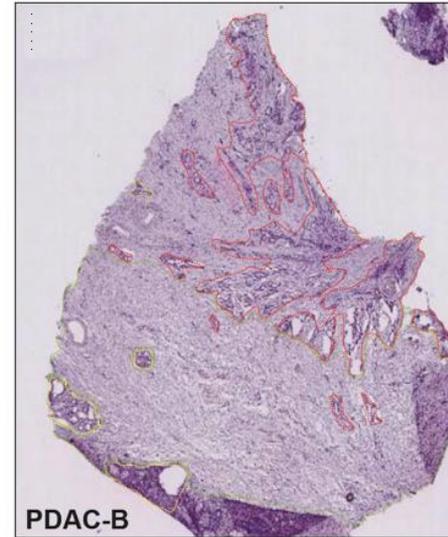
Spatial transcriptomics on a melanoma tumor reveals expression of the stress module in the cancer region



Spatial transcriptomics on pancreatic ductal adenocarcinoma (PDAC) tumor samples



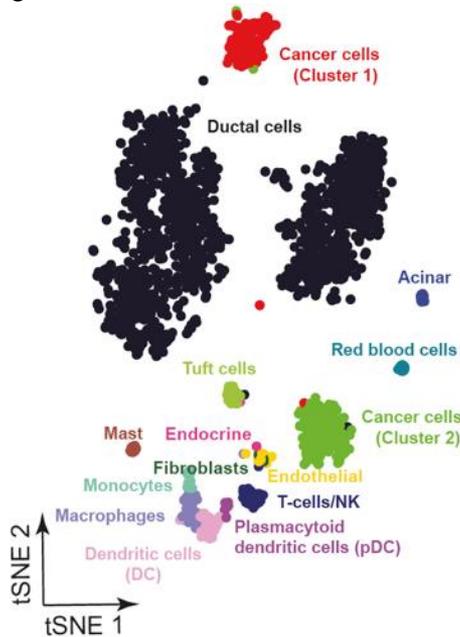
- Cancer tubules and desmoplasia
- Duct epithelium
- Normal pancreatic tissue
- Interstitium



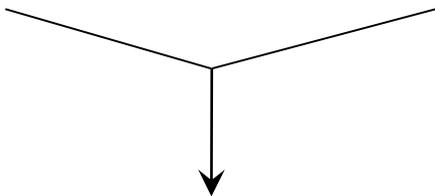
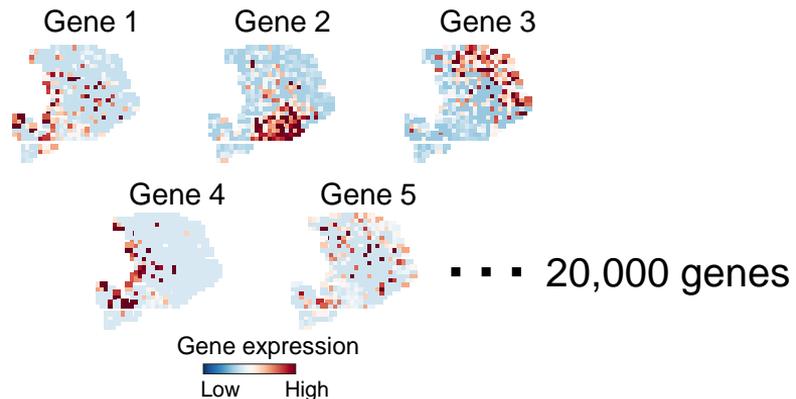
Diane M. Simeone and Cristina H. Hajdu

Integration of single-cell and spatial resolution

Single-cell resolution from scRNA-Seq

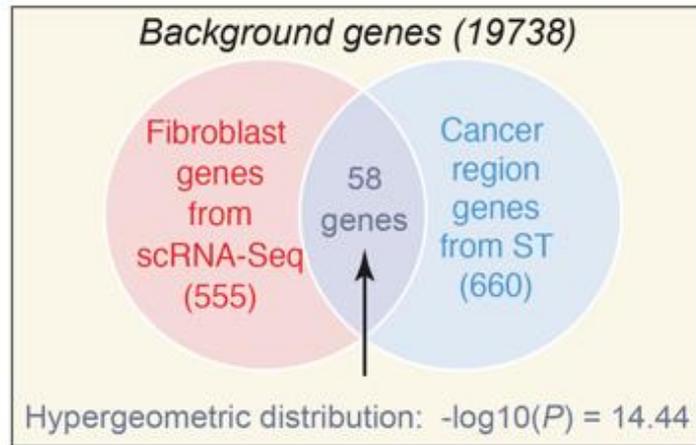


Gene expression with spatial resolution from ST

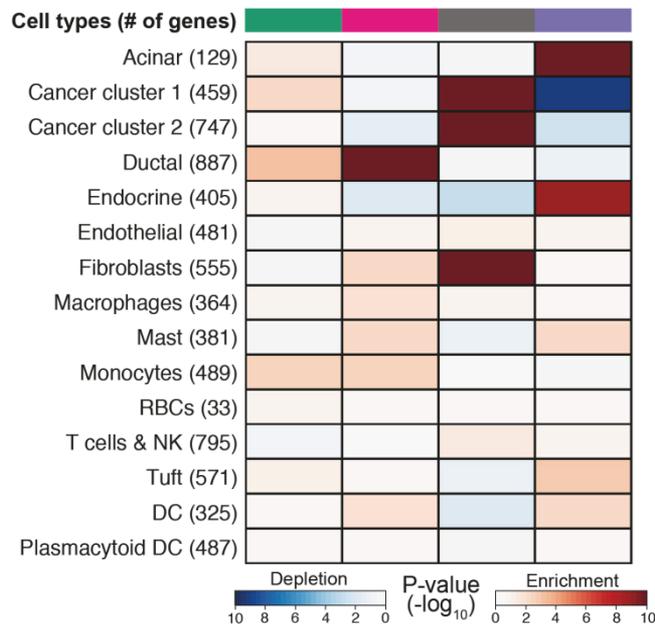
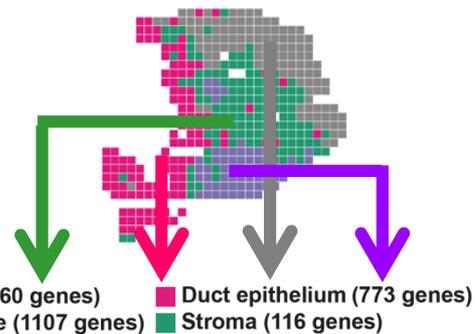
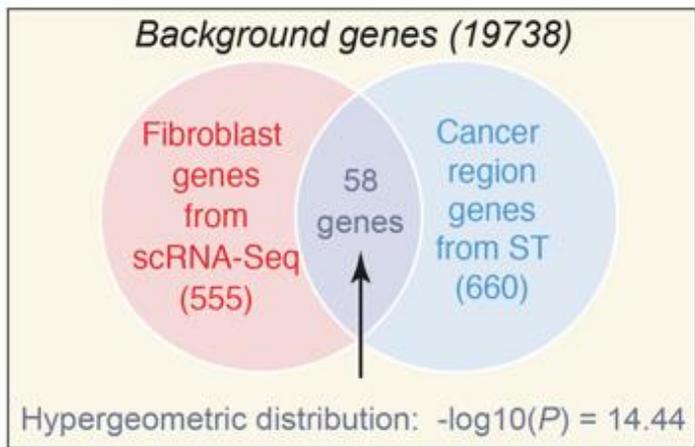


Spatial determinants of transcriptional states

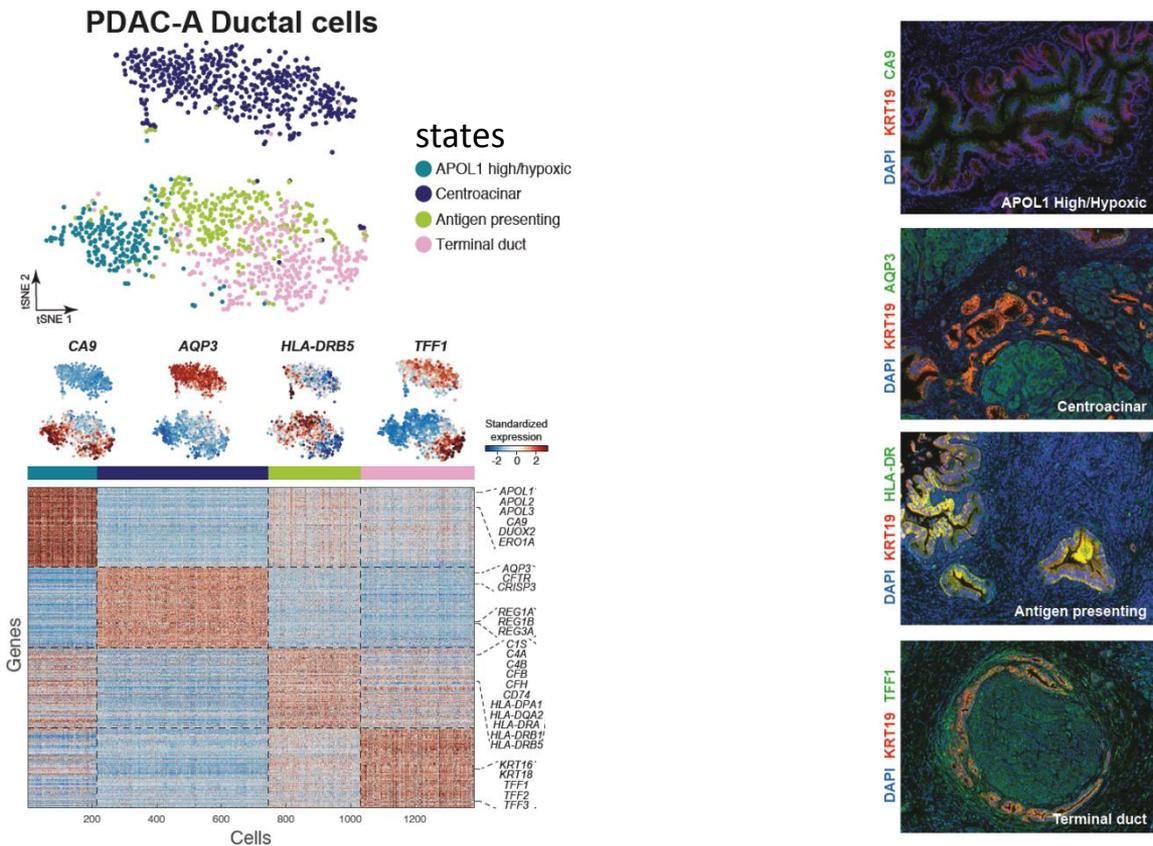
Multimodal Intersection Analysis (MIA) for the tissue-wide inference of cell type localization



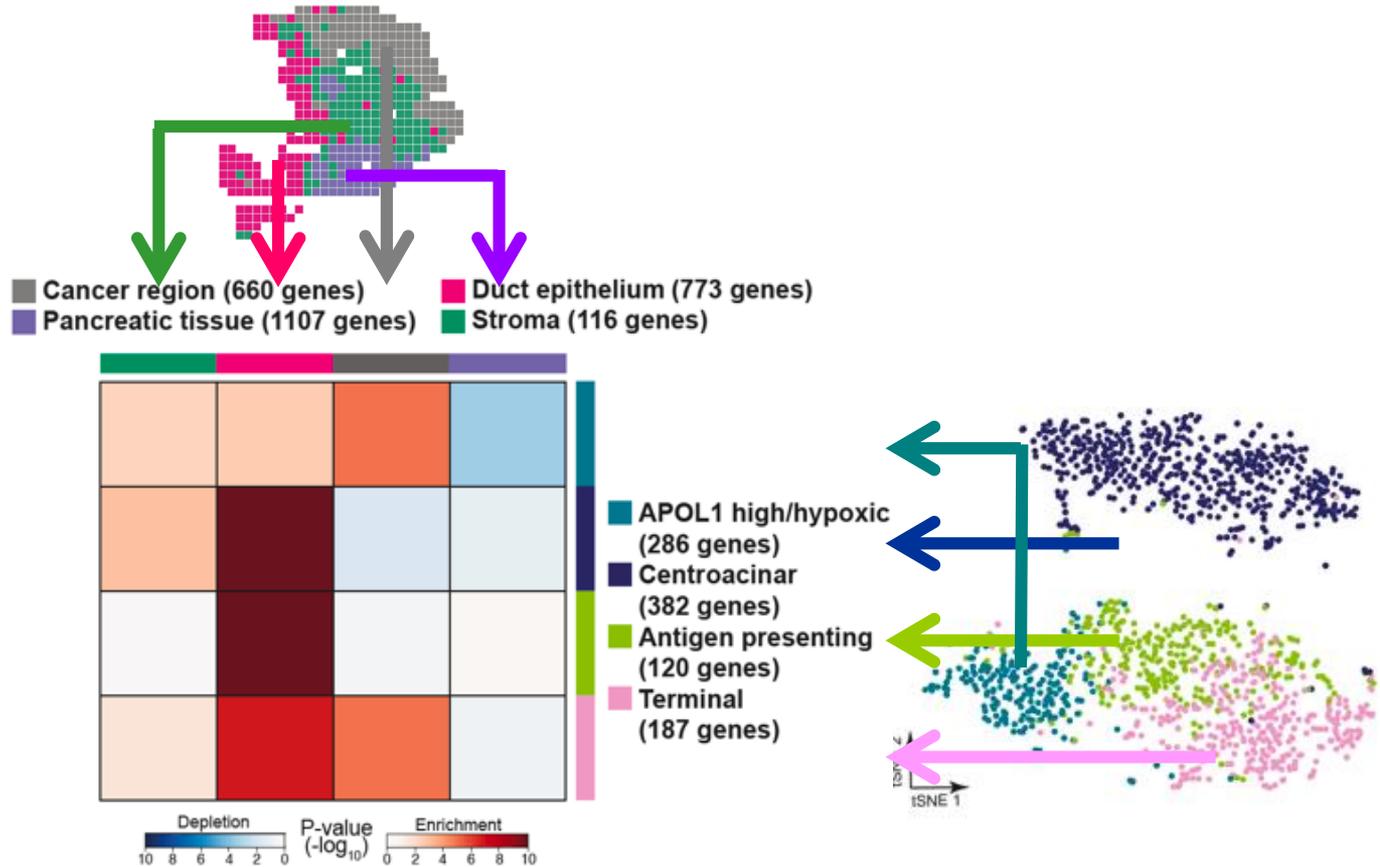
Multimodal Intersection Analysis (MIA) for the tissue-wide inference of cell type localization



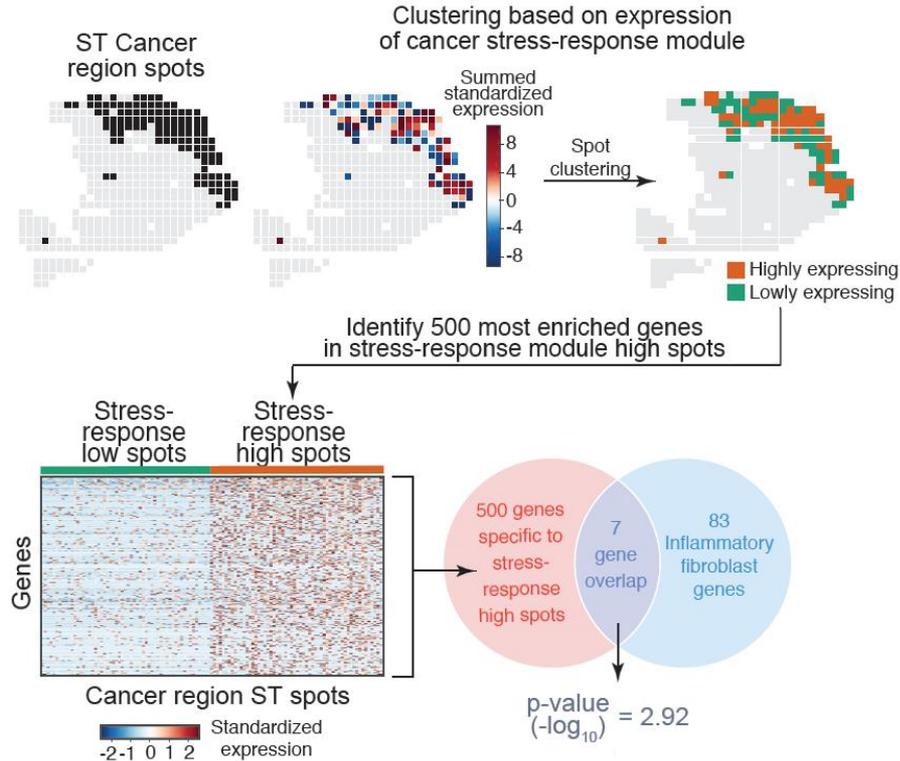
Identifying states among the ductal cells



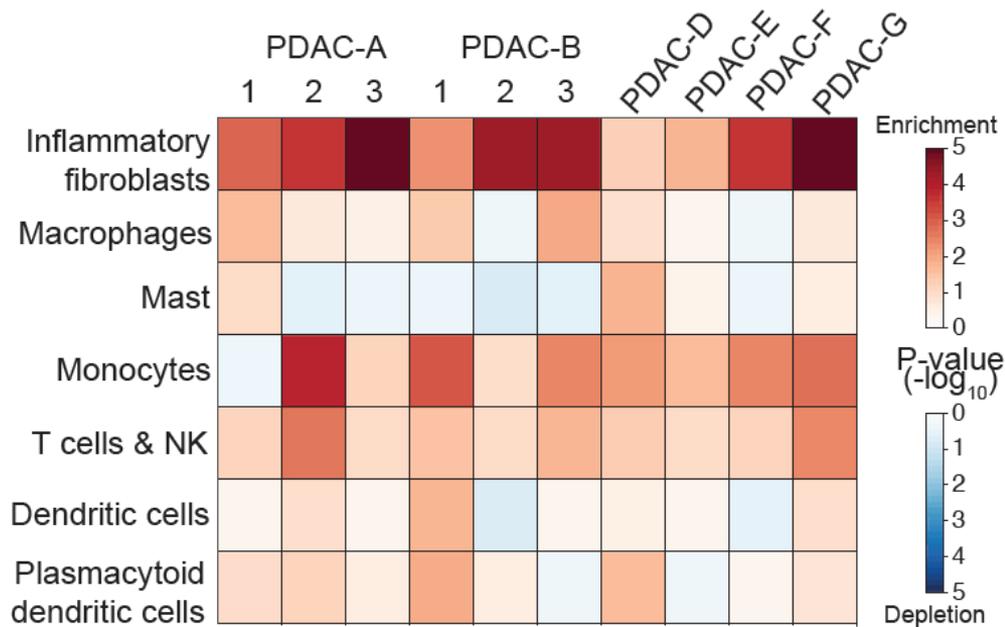
Ductal states across PDAC tissue regions



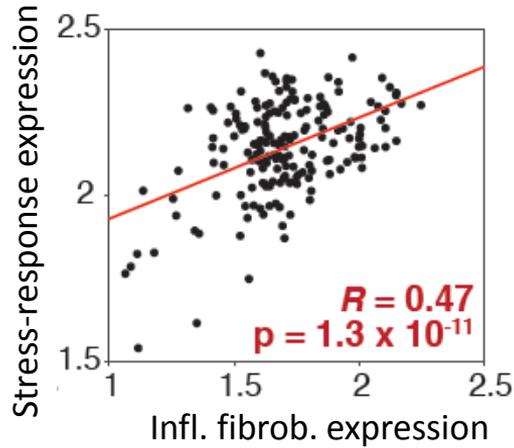
Querying for associations between cell states and cell types of the TME



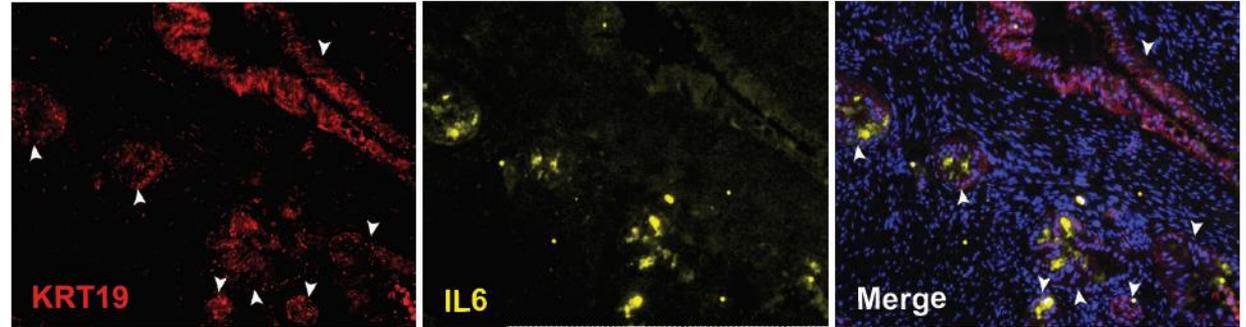
Inflammatory fibroblasts are consistently associated with cancer cells expressing the stress module



The stress module is correlated with inflammatory fibroblasts in the TCGA dataset and in IFs



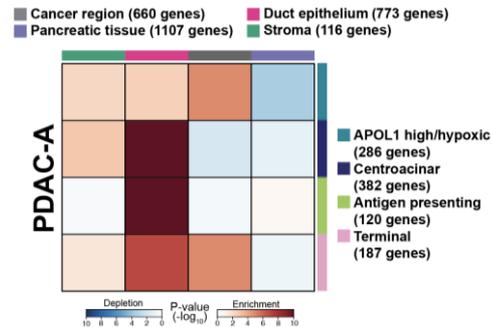
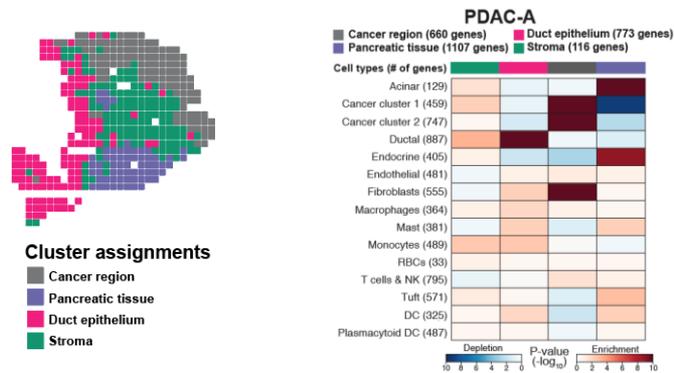
TCGA data



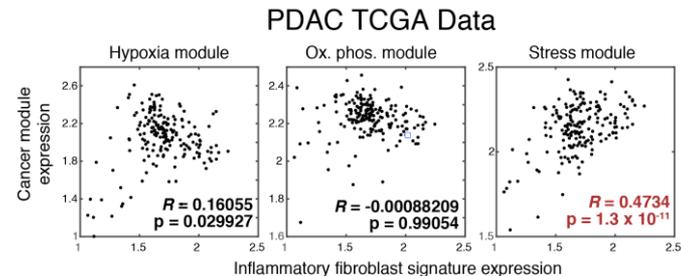
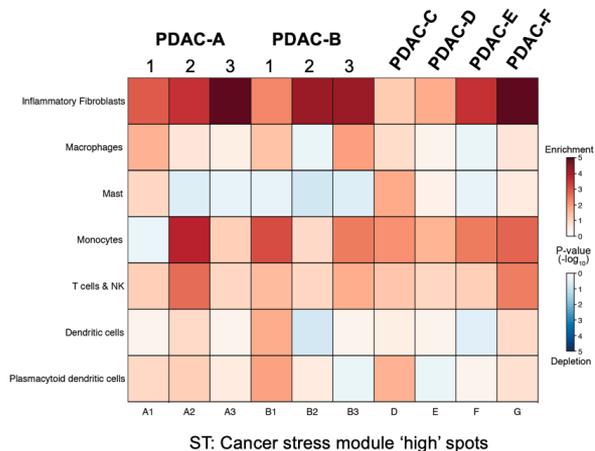
Immunofluorescence

Summary

Multimodal intersection analysis (MIA) maps scRNA-Seq states onto ST tissue regions



MIA highlights a potential functional relationship between inflammatory fibroblasts and a pan-cancer stress state in PDAC cancer cells



Acknowledging our wonderful lab and collaborators!



MSK



Dr. Richard White



Isabella Kim



Nate Campbell



Mohita Malay Tagore



Miranda Hunter

Alumni:

- Dr. Tamar Hashimshony
- Dr. Vlad Grishkevich
- Dr. Noa Sher
- Dr. Alison Cole
- Dr. Harel Zalts
- Dr. Michal Levin
- Martin Feder
- Leon Anavy
- Sally Khair
- Natalia Mostov
- Naftalie Senderovich
- Shay Ben-Elazar
- David Silver
- Avital Polsky



Dr. Cristina H. Hajdu



Dr. Diane M. Simeone



Dr. Maayan Pour



Dr. Gustavo Franca



Bo Xia



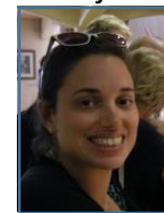
Dr. Florian Wagner



Dr. Maayan Baron



Dr. Anjali Rao



Dr. Gal Avital



Dalia Barkley



Reuben Moncada



Felicia Kuperwaser



Itai.Yanai@nyulangone.org

A large, colorful microscopic image of cells, likely a histological section, showing various shades of red, green, and purple against a dark background. The text is overlaid on the left side of this image.

**Institute for
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biomedical challenges.