The Evaluation of Time-Dependent Molecular Motifs of Pulmonary Fibrogenesis in COVID-19

Background

- Progressive pulmonary fibrosis is largely described as sequela of acute respiratory distress syndrome (ARDS.)
- COVID-19 related ARDS is characterized by further disease-specific histological hallmarks.
- Gene expression analysis has proven to be a useful way of characterizing the complexity of fibrosis.

Research Question

Can NanoString's Fibrosis Panel help to understand the underlying molecular mechanisms involved in pulmonary fibrosis as a result of COVID disease?

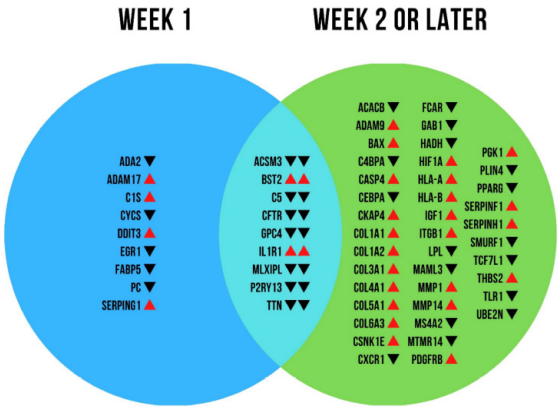

Figure 1. mRNA expression analysis
Venn diagram of differentially regulated genes over time. Arrows indicate increased (red arrow up) or decreased (black arrow down) activity of the respective genes in the group of patients who succumbed to COVID-19 within the first week of hospitalization ("week 1") or later ("week 2 or later") compared to healthy control lungs, respectively. In the overlapping area (middle), the left and right arrows indicate the expression in week 1 and week 2 or later, respectively. Figure reproduced with permission from Kamp et al. Int. J. Mol. Sci. 23, 1583 (2022) under the ***Creative Commons license***

Experimental Setup

Sample Type	FFPE
Tissue Type	Human lung
Assay	Fibrosis Panel
Analyte	RNA
Instrument	nCounter® Analysis System

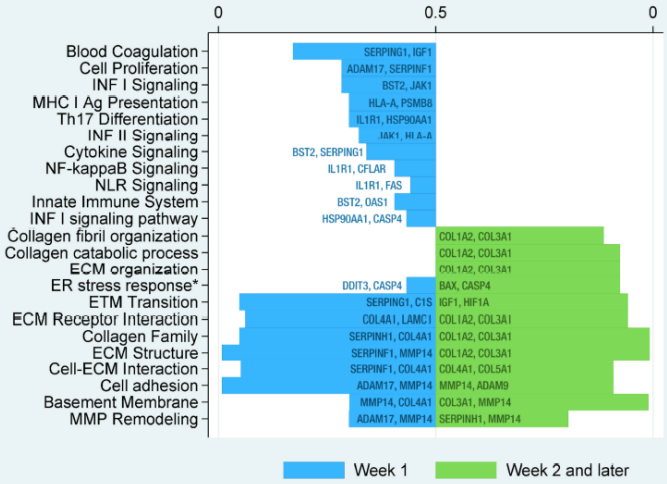

Figure 2. Fibrosis-related pathways
Significantly regulated biological pathways over time and corresponding false discovery rate (fdr) values. Figure reproduced with permission from Kamp et al. Int. J. Mol. Sci. 23, 1583 (2022) under the ***Creative Commons license***

Results & Conclusions

- Entire study group showed increased expression of *BST2* and *IL1R1*.
- Two major findings discriminating early from late COVID-19 cases with respect to potential therapies:
  - Early: increased expression of *PDGFRB* on the mRNA and on the protein level in patients who succumbed in the second week of hospital stay or later.
  - Late: increased activity of *HIF1A*.
- After first week of hospitalization: shift from pro-inflammatory to fibrogenic activity in severe COVID-19.
- *IL1R1* and *PDGFRB* may serve as potential therapeutic targets in future studies.

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For more information, please visit nanostring.com/FibrosisPanel

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