Molecular Cartography of 'Healthy' and 'Diseased' Gingival Tissues

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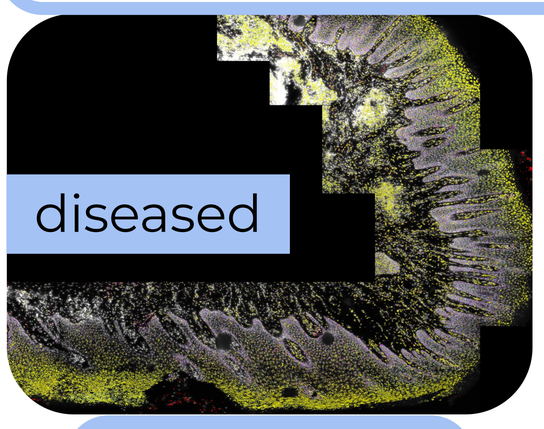
Background & Aim

- Previous 'transcriptomic' studies identify potentially relevant signatures in healthy vs periodontally diseased tissues
- BUT these only represent 'mixed bag of tissue'
- Thus, cannot or only incompletely account for signatures of individual cell populations in specific layers of tissue

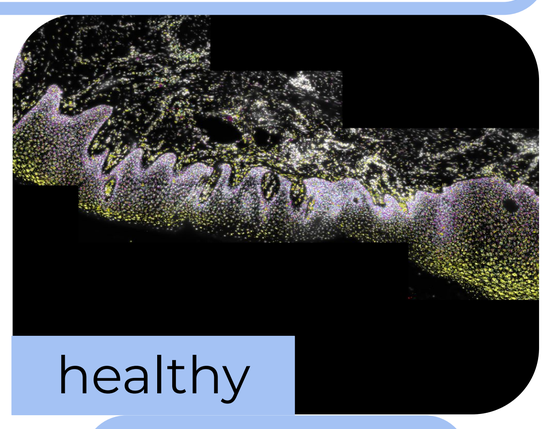
- We **aim** to identify spatial transcriptomic signatures
  (i) define transition from healthy to diseased
  (ii) help explain grade B to grade C
  (iii) link to bacterial-host interaction

Patients

- systemically healthy, previously untreated non-smokers ≥ 18 y/o
- One healthy & disease sample per patient



BoP
PPD ≥ 4 mm
CAL ≥ 3 mm



no BoP
PPD < 5 mm
CAL < 5 mm

Methods

Cryosectioning of tissue samples

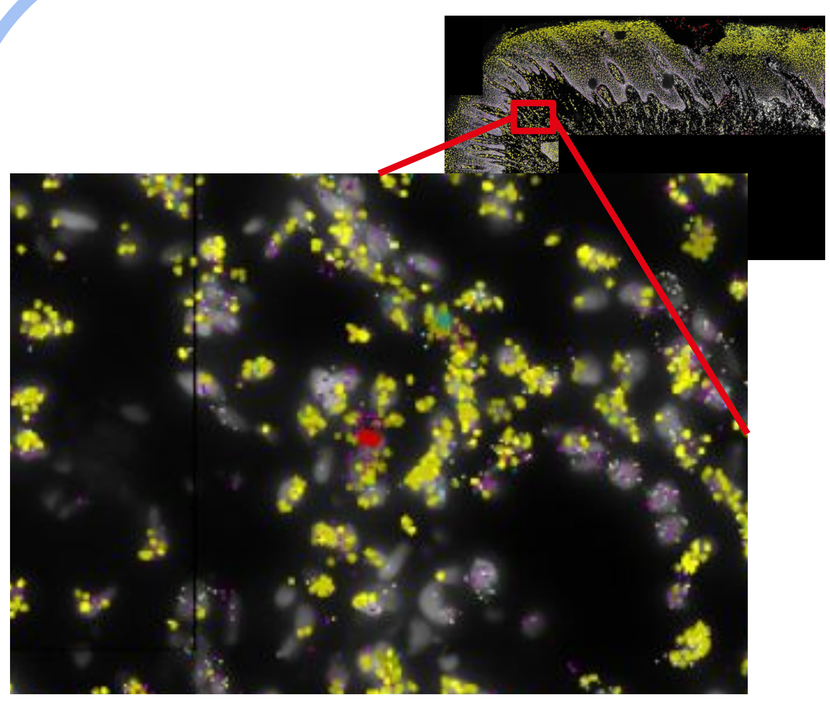
Hybridization of transcript-specific probes (Serial FISH with probes for bacterial and transcript panels)

Coloring of probes enables by new technology

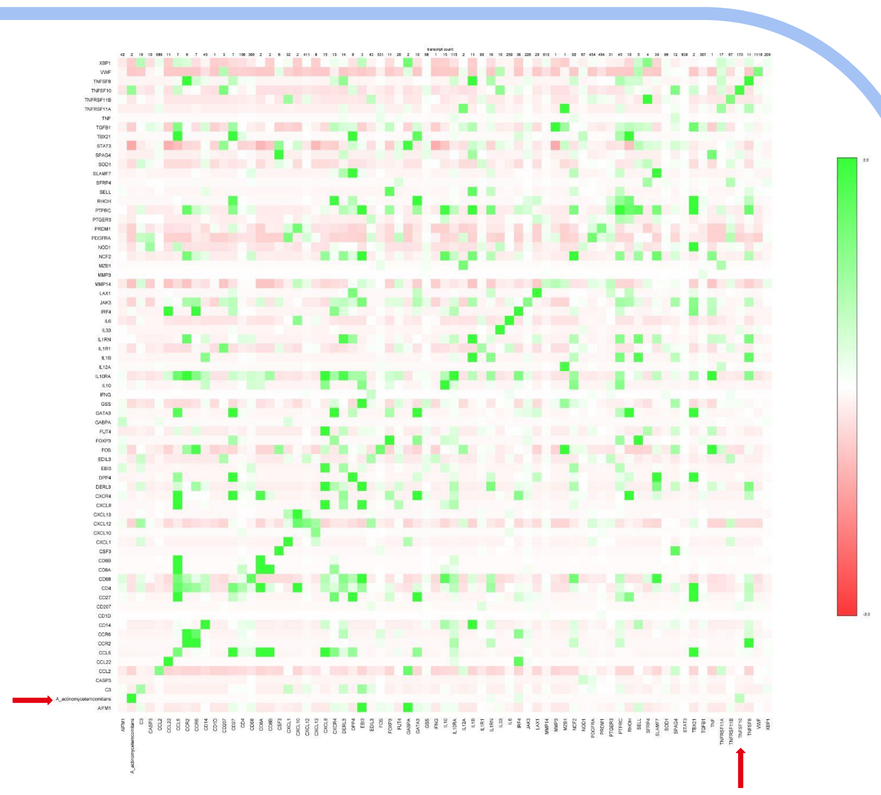
Sample Images of Sections

Decolorization of Probes

Results



- Closer look at diseased sample
- Red: *A. actinomycetemcomitans*
  - Invasive nature
- Dark purple: **apoptotic signals**
  - Increased rate of these signals found around bacterium



- Co-localization analysis
- Red: negative association
- Green: positive association
- A.a. not very active, but highly association with TNFSF10 (apoptotic marker)

Conclusion

- Specific spatial transcriptomic signatures exist that help differentiate healthy and disease periodontal status as well as disease progression rates
- These can be defined to specific cell populations and locations within tissue and co-locate in part with specific periodontal microbiota
- This data might help improve early diagnostics of progressive disease and inform targeted therapeutic approaches

References

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Caton, J, Armitage, G, Berglundh, T, et al. A new classification scheme for periodontal and peri-implant diseases and conditions – Introduction and key changes from the 1999 classification. J Clin Periodontol. 2018; 45(Suppl 20): S1-S8. https://doi.org/10.1111/jcpe.12935

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