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Poster #42: Spatial regulation of bacterial antiphage defense systems within biofilms

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Bacterial communities organized in biofilms exhibit distinct immune properties that enhance resistance against bacteriophage predation. Key players in the bacterial immune response are antiphage defense systems that restrict phage replication. However, the regulation and function of these defense systems within biofilms remain poorly understood, as most studies rely on liquid cultures that do not reflect native physiological conditions. Here, we hypothesize that bacterial communities regulate endogenous defense systems in a spatial and cell-specific manner. To investigate this, we use *Pseudomonas aeruginosa* biofilms as a model system in combination with BiofilmEx, an advanced spatial transcriptomics imaging technique that is based on expansion microscopy. We visualize and quantify transcript distributions across millions of sessile cells in three dimensions at single-cell resolution, enabling comprehensive mapping of defense system expression within intact biofilms. Together, this work will advance our understanding of bacterial immunity in structured communities and expand the methodological toolkit for biofilm research.

Reference #1

Reference #2

Reference #3

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