On Feasibility of Fluorescence-Based Bacteria Presence Quantification: *P. aeruginosa*

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**RESULTS**

Calibration procedure shows the following dependence between bacteria concentration N (CFU/mL) and optical density OD (R²=0.991):

\[ N = (5 \times 10^9 \times OD)^{0.97} \]

We have performed three types of experiments:

1. Dependence of bacterial growth and fluorescence on temperature
2. Dependence of bacterial growth and fluorescence on inoculum concentration
3. Dependence of bacterial growth and fluorescence on initial nutrient concentration

**DISCUSSION**

- We have performed simultaneous measurements of optical density (OD600) and fluorescence of *P. aeruginosa* (PA01) in media, which allow direct correlation between fluorescence and bacterial concentration.
- Pyoverdine production is affected by numerous factors, including ambient temperature, inoculum concentration, and initial nutrients concentration.
- In nutrient-rich media (1.5 and 3.0 g/L) bacteria demonstrate delayed production of pyoverdine.
- In nutrient-poor media (0.3 and 0.6 g/L) bacteria start producing pyoverdine almost immediately.
- Other caveats:
  - Pyoverdine fluorescence is affected by two additional factors: a) iron bound to pyoverdine quenches fluorescence, b) pyoverdine production is affected by iron availability. Thus, *P. aeruginosa* fluorescence can be diminished near blood vessels.
  - *P. aeruginosa* isolated from acute infections differs substantially in phenotype from those isolated from chronic infections.
  - Fluorescence in the tissue can differ significantly from experiments in the media. It was estimated that for pyoverdine fluorescence the correction factor can be in the range of 2-2.25.
- In future work, we plan to investigate feasibility of bacterial load quantification for another model: porphyrins production by *S. aureus*.

**REFERENCES**


**CONCLUSIONS**

- *P. aeruginosa* is a versatile and opportunistic microorganism. It remains metabolically active even at 43°C.
- Pyoverdine production is affected by numerous factors, including ambient temperature, inoculum concentration, and nutrients availability.
- Feasibility of in vivo *P. aeruginosa* load quantification seems problematic at this point. Further experiments are required.

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