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Impact of gaseous NO₂ on *P. fluorescens* strain in the membrane adaptation and virulence

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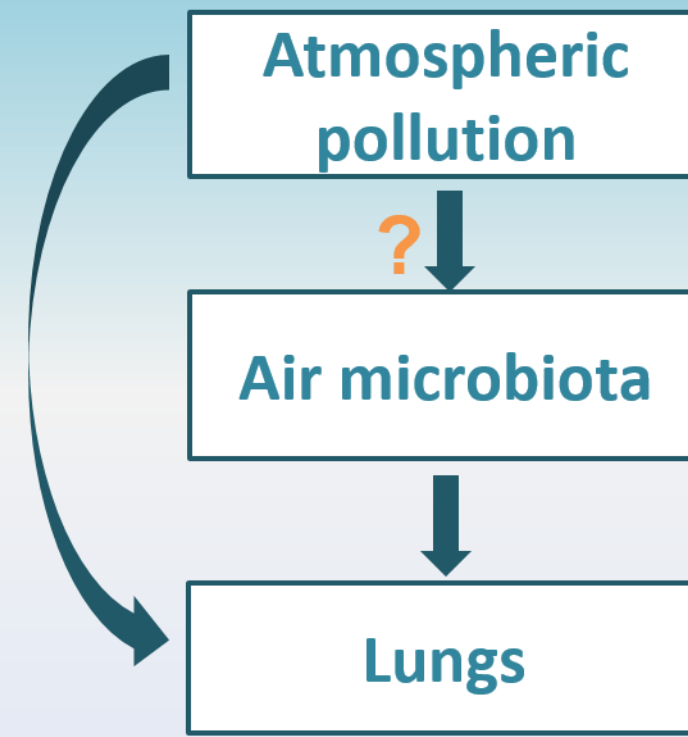
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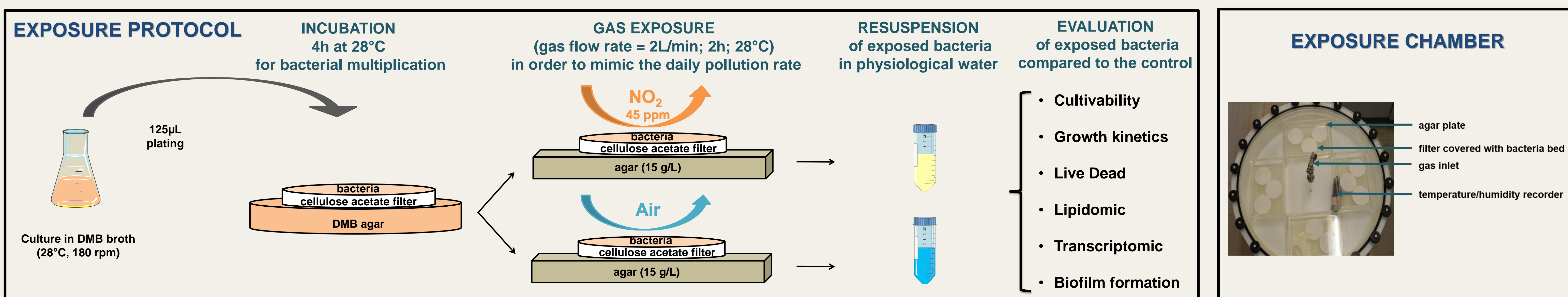
Introduction:

Nowadays air pollution is clearly increasing due to anthropogenic activity despite more drastics regulations. Among all air pollutants, Nitrogen oxides (NO_x), such as NO and NO₂, are predominant. It is well-known that those compounds exhibit direct high toxic effects on human health especially on skin and lung^{1,2}. However microorganisms are also exposed to them, but their synergy with microorganisms on microbial virulence is still not stated.

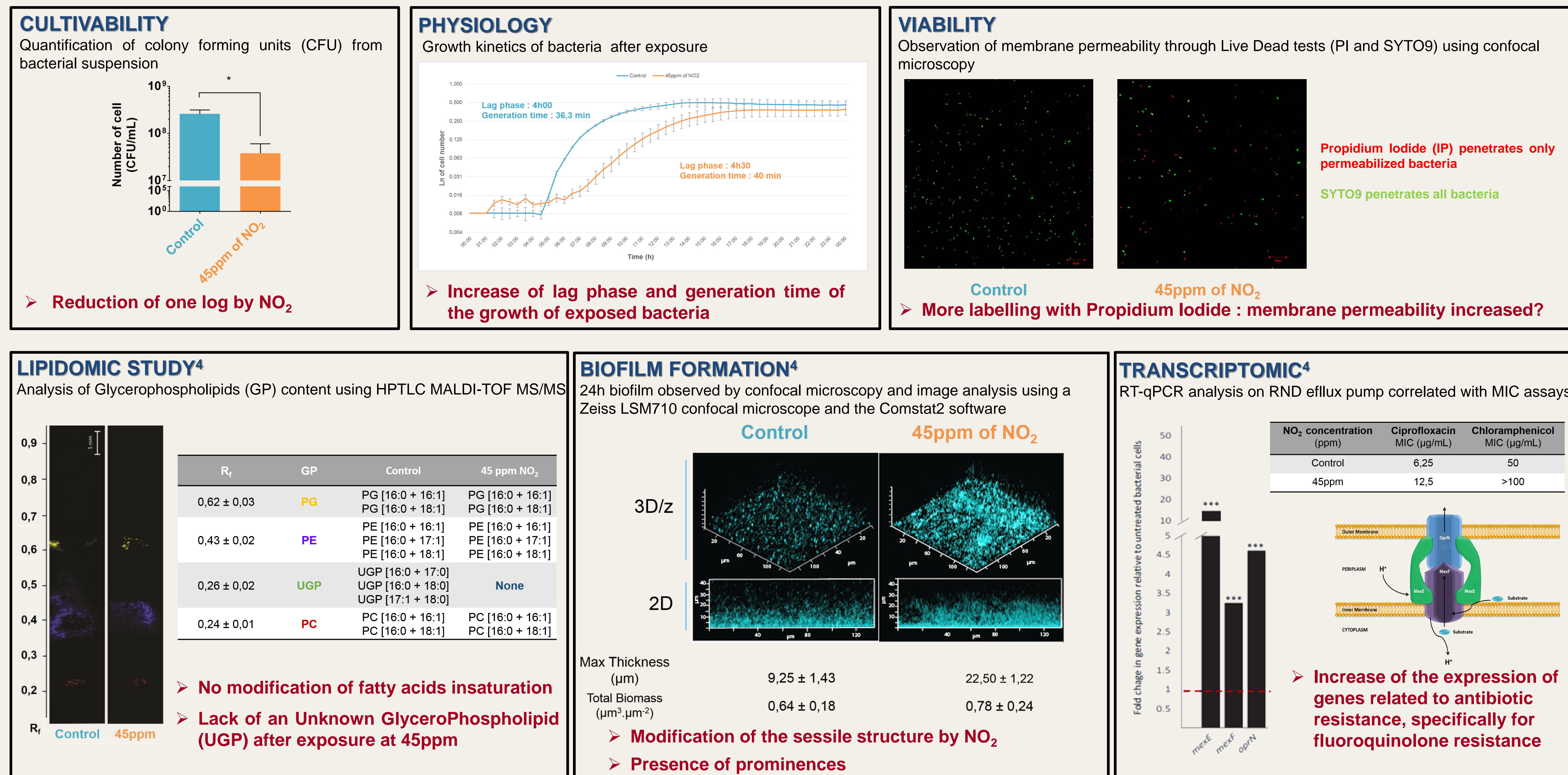


In this study, we tried to evaluate the response of an airborne strain of *P. fluorescens*, MFAF76a³ to a two hours exposure at 45ppm NO₂. The physiological behavior of the strain was measured using cultivability and growth kinetics. Moreover the membrane adaptation was assessed thanks to permeabilization tests and lipidomic studies. Then virulence factors such as biofilm formation and antibiotic resistance were studied.

Material and methods:

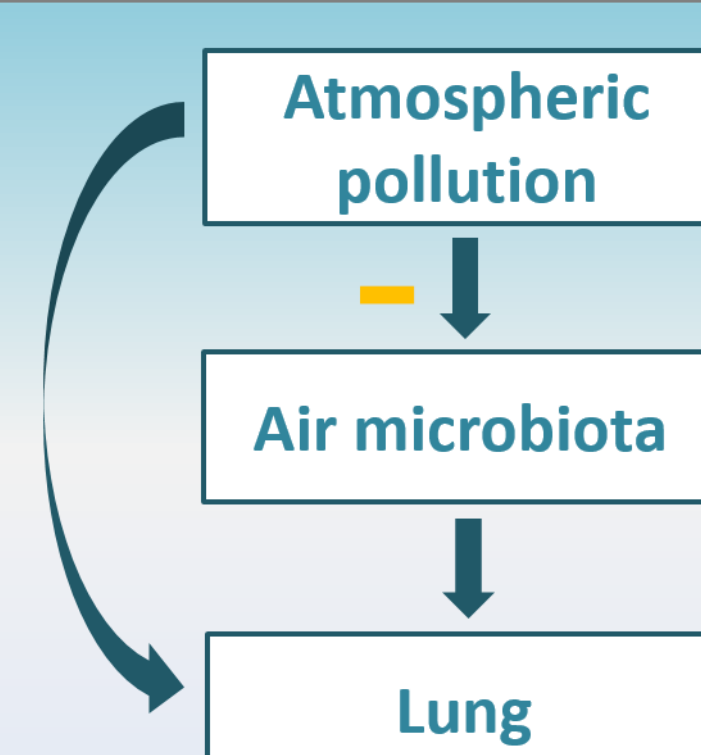


Results:



Conclusion:

Deleterious effects of NO₂ (45ppm, 2h) were noticed for an airborne strain *Pseudomonas fluorescens* MFAF76a, with an important loss of cultivability and an increased lag-phase of the growth kinetics. A significant alteration of the membrane permeability was observed. However no significant modification of glycerophospholipids content was measured except for an Unknown Glycerophospholipid (UGP). The exposed strain seems to form more prominences highlighting the heterogeneity in the biofilm structure.



For virulence factors, NO₂ exposure increases the resistance of MFAF76a for fluoroquinolones confirmed by transcriptomic analysis and MIC assays. Now our project is focused on the impact of lower concentration of NO₂ mimicking the daily pollution rate which could be less toxic for bacteria. In such conditions, more phenotypes related to virulence and adaptability could be enhanced.