**P1277**
**Paper Poster Session**
**Discovery of more new antibacterial drugs**

## Mode of antimicrobial and anti-biofilm activity of peptide mimetics

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**Background:** Bacterial resistance to conventional antibiotics due to use and overuse has enabled a rise of multiple drug resistant (MDR) bacteria, an increasingly serious global health concern. The situation is aggravated in non-planktonic cells, which are bacterial communities attached to any kind of surface as a result of adaptive response to various environmental stress factors. Non-planktonic cells cause biofilm formation and as such are able to resist the host defense mechanism and exhibit significant increased resistance to antimicrobial agents ranging from 10 to 1000-fold. Here, we report detailed mode of antibacterial activity of peptoids on planktonic bacteria along with their anti-biofilm activity using inhibition and eradication assays.

**Material/methods:** The killing kinetics of *E.coli* (ATCC 25922) challenged by the two most active peptoids, was determined by single colony counts for a period of 6h. Flow cytometry was used to investigate the peptoid effect on both bacterial DNA content and change in the cell size. Liposome leakage assays were determined using membrane compositions to mimic both mammalian (POPC:POPG:Cholesterol) and prokaryotic (POPC:POPG) membranes. Antibiofilm activity was measured using crystal violet staining assays for both eradication of preformed biofilm and inhibition of biofilm formation. Change in membrane morphology was determined using scanning electron microscopy.

**Results:** Killing kinetics experiments revealed decrease of bacterial viability over a period of 6 h. Quantification of the membrane integrity experiments show that the membrane integrity of *E.coli* remained compromised after 2h of treatment with peptoids in comparison to the native peptide. Flow cytometry data demonstrated decrease of the DNA/cell size upon incubation of *E.coli* with 4xMIC concentration for a period of 3h. Together with the calcein leakage data that revealed low frequency of membrane disruption by pore formation, and extensive cell elongation observed from SEM images, suggest mode of action related to inhibition of intracellular processes rather than just memorable disruption. Peptoids reveal high anti-biofilm activity by successfully inhibiting and eradicating biofilm formation.

**Conclusions:** In the present we have characterized the antimicrobial activity of two peptoids and found that they effectively inhibit bacterial growth by combined mode of action that involves compromising the membrane integrity and acting on intracellular targets. These peptoids successfully inhibit *E. coli* and *P. aeruginosa* biofilm formation and eradicate preformed biofilm. In perspectives we aim at using these peptoid for coating medical devices prone to biofilm formation.

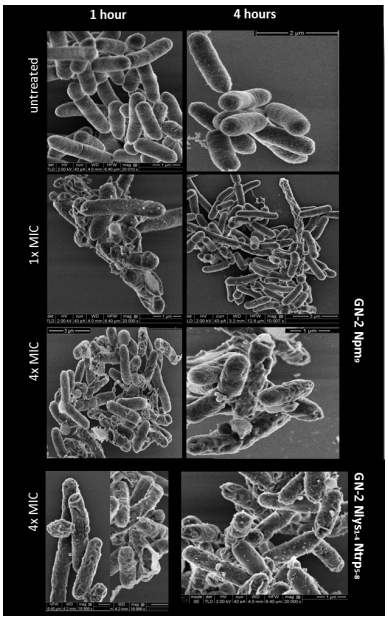


Figure 1. Scanning electron micrographs of *E. coli* ATCC 25922 untreated and exposed to peptoids GN-2 $Nlys_{1\text{-}4}$ $Ntrp_{5\text{-}8}$ (1x MIC not shown) and GN-2 $Npm_9$ at concentrations corresponding to 1x and 4x MIC for a period of 1 h and 4 hours. Cultures in log phase at 2-4 x $10^7$ CFU/ml.