Influence of chromosomal mutations in genes encoding MtrCDE efflux, PorB1b porin, and PBP1 on susceptibility towards multiple antibiotic classes in clinical isolates of Neisseria gonorrhoeae.

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Introduction & Purpose

Antibiotic resistance in Neisseria gonorrhoeae is steadily rising, reducing treatment options. Common resistance mechanisms include increased efflux through the MtrCDE efflux pump, decreased permeability through the PorB1b porin (porB), and reduced affinity of PBP1 (ponA) for β-lactam antibiotics (Unemo & Shafer, 2014). These three mechanisms all result from chromosomal lactam antibiotics (Unemo & Shafer, 2014).

Materials & Methods

- 50 clinical isolates from the national reference centre of Belgium.
- Minimum inhibitory concentrations (MICs) determined by agar dilution using GC agar plates with increasing concentrations of 8 antibiotics.
- Presence of mutations in the mtrR, porB and ponA genes determined by PCR.

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Statistical analyses using Wilcoxon Rank-Sum Test * No data for 2 isolates

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Conclusions

- All strains are susceptible to CRO and SPT.
- 1/4 are intermediate to AZM but 2/3 are co-resistant to PEN, TET, CIP.
- Isolates with mutations in mtrR have higher MICs to all antibiotics tested, except CFM and SPT (Table).
- Isolates with mutations in porB or porA have higher MICs to all antibiotics except SPT (Table).
- Isolates with mutations in all 3 genes have higher MICs to all antibiotics except SPT (right Figure and Table).

Results

- Mutations in mtrR seem to increase MICs of many but not all antibiotics among those studied, highlighting the interest of further studying the substrate specificity of this transporter.
- The fact that mutations in porin or PBP are also found in isolates with elevated MICs to non-β-lactams like AZM and CIP is probably simply attributable to the concomitant presence of other mechanisms reducing antibiotic activity in these isolates. This warrants the interest of studying these mechanisms, like mutations in macrolide or fluoroquinolone target, in this collection.

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