

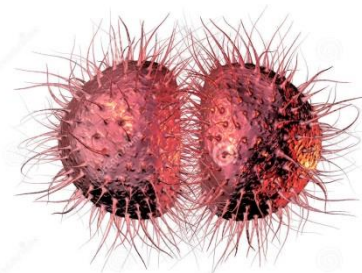
**Neisseria gonorrhoeae** – Oxidase positive, nonmotile GNC

Neisseria are cocci with a diameter of up to 2 µm, presenting as single bacteria or in pairs.

Most known pathogenic are -

N.gonorrhoeae  
N.meningitidis

are fastidious, die in extreme temperatures, desiccation, and alkaline or acidic conditions



**Capsules** (N. meningitidis – 12 different types) and pili (N. meningitidis and N. gonorrhoeae) are present, but flagella are not formed on *Neisseria* spp.

Neisseria have a high affinity for mucosal membranes and large number can be found on humans - *N.*

*gonorrhoeae*, *N. cinerea*, *N. elongata*, *N. flavescens*, *N. lactamica*, *N. meningitidis*, *N. mucosa*, *N. polysaccharaea*, *N. sicca*, and *N. subflava*.

*NOTE* - *Neisseria elongata*, *N. weaveri*, *N. bacilliformis*, and *N. shayeganii* sp. nov. are not cocci but **short rods**, frequently arranged as diplobacilli or in chains.

**Epi** – 100-120million new cases /yr

**Clinical presentation** – asymptomatic infection, cervicitis, urethritis, salpingitis, PID, Fitz-Hugh curtis syndrome, conjunctivitis (neonatal), tenosynovitis, septic arthritis, DGI, Endocarditis.

**Microscopy** - Gram-negative diplococci associated with or within PMNs

**Culture – Chocolate agar, OR Selective media** – modified Thayer Martin OR NYC agar (peptone-corn starch agar-base buffered with phosphates and supplemented with horse plasma, horse haemoglobin, dextrose, yeast autolysate and antibiotics (vancomycin /colistin/ Bactrim /amphotericin).

Identification – MalDI-ToF useful, otherwise API-NH,

**AST** - GC agar containing 1% growth supplement for disk diffusion testing – CLSI/EUCAST

- CLSI – WT <1 µg/mL and NWT >2µg/mL for azithromycin, Pen DiscDiffusion >47mm, Ceftria DiscDiffusion > 35
- EUCAST – no DD, only MIC values recommended Ceftriaxone >0.125µg/mL

**Treatment** – ceftriaxone 500mg IM + azithromycin 1g – uncomplicated.

**Resistance in Australia** – Penicillin (22.5% R), Cipro – (27.2% R), Ceftriaxone (1.8% R)

Penicillin beta lactamase – PPNG PCR available, Cipro - SNPs in gyrA alone provide low- to intermediate-level resistance, but high-level resistance needs mutations in parC (topoisomerase IV) Ceftriaxone mutation in PBP2 (penA) site, Azithromycin rRNA methylase (erm) or efflux pump.

**Table 3: Proportion of gonococcal isolates with resistance to azithromycin, penicillin and ciprofloxacin and decreased susceptibility to ceftriaxone reported, Australia, 2015, by state or territory**

| State or territory                 | Number of isolates tested | Decreased susceptibility Ceftriaxone |     | Resistance   |     |            |      |               |      |
|------------------------------------|---------------------------|--------------------------------------|-----|--------------|-----|------------|------|---------------|------|
|                                    |                           | n                                    | %   | Azithromycin |     | Penicillin |      | Ciprofloxacin |      |
|                                    |                           | n                                    | %   | n            | %   | n          | %    | n             | %    |
| Australian Capital Territory       | 69                        | 0                                    | 0.0 | 0            | 0.0 | 23         | 33.3 | 18            | 26.1 |
| New South Wales                    | 1,905                     | 52                                   | 2.7 | 43           | 2.3 | 588        | 30.9 | 684           | 35.9 |
| Queensland                         | 728                       | 7                                    | 1.0 | 42           | 5.8 | 201        | 27.6 | 186           | 25.5 |
| South Australia                    | 251                       | 9                                    | 3.6 | 7            | 2.8 | 52         | 20.7 | 103           | 41.0 |
| Tasmania                           | 23                        | 0                                    | 0.0 | 1            | 4.3 | 2          | 8.7  | 0             | 0.0  |
| Victoria                           | 1,695                     | 25                                   | 1.5 | 30           | 1.8 | 257        | 15.2 | 383           | 23.0 |
| Northern Territory/ Urban          | 76                        | 0                                    | 0.0 | 0            | 0.0 | 11         | 14.5 | 8             | 10.5 |
| Northern Territory/ Remote & Rural | 182                       | 0                                    | 0.0 | 0            | 0.0 | 4          | 2.2  | 6             | 3.3  |
| Western Australia/Urban & Rural    | 395                       | 5                                    | 1.3 | 15           | 3.8 | 77         | 19.5 | 82            | 20.8 |
| Western Australia/Remote           | 87                        | 0                                    | 0.0 | 0            | 0.0 | 2          | 2.3  | 3             | 3.4  |
| Australia                          | 5,411                     | 98                                   | 1.8 | 138          | 2.6 | 1,217      | 22.5 | 1,473         | 27.2 |

TABLE 2 Characteristics of medically relevant *Neisseria* species<sup>a</sup>

| Species                     | Morphology | Growth on selective media | Acid production from: |     |     |     |     | Nitrate reduction | Polysaccharide from SUC | Reference |
|-----------------------------|------------|---------------------------|-----------------------|-----|-----|-----|-----|-------------------|-------------------------|-----------|
|                             |            |                           | GLU                   | MAL | LAC | SUC | FRU |                   |                         |           |
| <i>N. animaloris</i>        | CR         | ND                        | +                     | 0   | 0   | 0   | ND  | +                 | ND                      | 146       |
| <i>N. bacilliformis</i>     | R          | 0                         | 0                     | 0   | 0   | 0   | ND  | V                 | ND                      | 10        |
| <i>N. cinerea</i>           | C          | V                         | 0                     | 0   | 0   | 0   | 0   | 0                 | 0                       |           |
| <i>N. elongata</i>          | C          |                           |                       |     |     |     |     |                   |                         | 1         |
| subsp. <i>elongata</i>      |            | 0                         | 0                     | 0   | 0   | 0   | 0   | 0                 | 0                       |           |
| subsp. <i>glycolytica</i>   |            | 0                         | (+)                   | 0   | 0   | 0   | 0   | 0                 | 0                       |           |
| subsp. <i>nitroreducens</i> |            | 0                         | 0                     | 0   | 0   | 0   | 0   | +                 | 0                       |           |
| <i>N. flavescens</i>        | C          | 0                         | 0                     | 0   | 0   | 0   | 0   | 0                 | +                       |           |
| <i>N. gonorrhoeae</i>       | C          | +                         | +                     | 0   | 0   | 0   | 0   | 0                 | 0                       |           |
| <i>N. lactamica</i>         | C          | +                         | +                     | +   | 0   | 0   | 0   | 0                 | 0                       |           |
| <i>N. meningitidis</i>      | C          | +                         | +                     | +   | 0   | 0   | 0   | 0                 | 0                       |           |
| <i>N. mucosa</i>            | C          | 0                         | +                     | +   | 0   | +   | +   | +                 | +                       |           |
| <i>N. polysaccharea</i>     | C          | V                         | +                     | +   | 0   | V   | 0   | 0                 | +                       |           |
| <i>N. sicca</i>             | C          | 0                         | +                     | +   | 0   | +   | +   | 0                 | +                       |           |
| <i>N. subflava</i>          | C          |                           |                       |     |     |     |     |                   |                         | 1         |
| bv. <i>flava</i>            |            | V                         | +                     | +   | 0   | 0   | +   | 0                 | 0                       |           |
| bv. <i>perflava</i>         |            | V                         | +                     | +   | 0   | +   | +   | 0                 | +                       |           |
| bv. <i>subflava</i>         |            | V                         | +                     | +   | 0   | 0   | 0   | 0                 | 0                       |           |
| <i>N. weaveri</i>           | R          | ND                        | 0                     | 0   | 0   | 0   | 0   | 0                 | ND                      | 159       |
| <i>N. zoodegmatidis</i>     | CR         | ND                        | V                     | 0   | 0   | 0   | ND  | V                 | ND                      | 146       |


<sup>a</sup>Symbols and abbreviations: 0, negative; +, positive; (+), weakly positive; R, rods; C, cocci; CR, coccoid rods; ND, not done; GLU, glucose; MAL, maltose; LAC, lactose; SUC, sucrose; FRU, fructose; V, variable.

### Molecular detection

Hybridization Assays – previously used – not as sensitive

NAAT detection – we use → Cobas4800 (DR9), GeneXpert (NG2 and NG4)

Comparative in house assays – *porA* and *opa* genes



***Neisseria gonorrhoeae* False-Positive Result Obtained from a Pharyngeal Swab by Using the Roche cobas 4800 CT/NG Assay in New Zealand in 2012**

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The Roche cobas 4800 CT/NG assay is a commonly used commercial system for screening for *Neisseria gonorrhoeae* infection, and previous studies have shown the method to be highly sensitive and specific for urogenital samples. We present the first confirmed clinical *N. gonorrhoeae* false-positive result using the cobas 4800 NG assay, obtained from testing a pharyngeal swab sample and caused by cross-reaction with a commensal *Neisseria* strain.

Pharyngeal *Neisseria* = (i.e., *Neisseria sicca*, *Neisseria perflava*, *Neisseria cinerea*, *Neisseria polysaccharea* and/or *Neisseria flavescens*) can have mutated DR9 sites.