

Emergence of Fluoroquinolone-Resistant

Neisseria meningitidis in Minnesota and North
Dakota

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Neisseria meningitidis

- Gram-negative diplococci
- 13 serological groups defined by polysaccharide capsule antigenicity
- Transmission
 - Airborne
 - Droplet
- They can become part of the bacterial flora of the nasopharynx
 - 5% of people are chronic carriers and serve as as reservoir for the spread of infections
 - Carriage rate can be as high as 35-50% in close quarters like dormitories and military bases.

Neisseria meningitidis

- **Incubation period: 1-10 days, most commonly less than 4 days**
- **Clinical syndromes caused by *N. meningitidis*:**
 - Meningitis: sudden onset of fever, stiff neck, and headache often with diffuse muscular pain (myalgia) and nausea/vomiting
 - Meningococccemia: disseminated infection in the blood stream
 - 10% of cases are fatal
 - 10-15% of survivors have long-term sequelae

Neisseria meningitidis

- Vaccine
 - Vaccine of *N. meningitidis* is based on the capsular polysaccharide of groups A, C, Y, and W-135
 - Vaccine with four groups conjugated to diphtheria toxoid is recommended for children whereas the unconjugated vaccine is for adults.
 - Neither vaccine contains Group B strain because it is not immunogenic!
- Treatment
 - Empiric treatment with Ceftriaxone and Cefotaxime
 - Prophylactic treatment with Rifampin in children and Ciprofloxacin in adults

Neisseria meningitidis

- MMWR highlights the emergence of 3 cases of Ciprofloxacin-resistant *N. meningitidis*.
- In 2006 a day care center worker in North Dakota became ill and died from Group B *N. meningitidis* that was fluoroquinolone sensitive.
 - Children received Rifampin prophylaxis while adults received Ciprofloxacin
- One of the students of the day care center worker became ill in January of 2007 with the same strain of Group B *N. meningitidis* that was now fluoroquinolone resistant.
 - Same chemoprophylaxis (before they knew that Cipro wouldn't work!)

Neisseria meningitidis

- In January of 2008, two more people, this time in Minnesota, developed meningococcal disease with the same fluoroquinolone resistant strain.
- **How was resistance determined?**
 - Minimum Inhibitory Concentration (MIC) obtained through culturing
 - PCR and sequencing of known genes involved in resistance (*gyrA*)

And now for something completely different....

- **Published in February 22, 2008 in Science:**

- New Polyomavirus discovered: Merkel Cell Polyomavirus
- Polyomaviruses are known oncogenic viruses
- Article by Feng et al.: thought to be involved in the pathogenesis of a rare skin cancer called Merkel Cell Carcinoma or MCC (small cell neuroepithelial tumor of the skin)
- MCC incidence has tripled over the past 20 years, mostly in elderly and immunocompromised.
- Other Polyomaviruses include JC Virus which causes Progressive Multifocal Leukoencephalopathy (viral infection of the white matter of the brain) and BK virus known for infecting kidneys and lungs.