

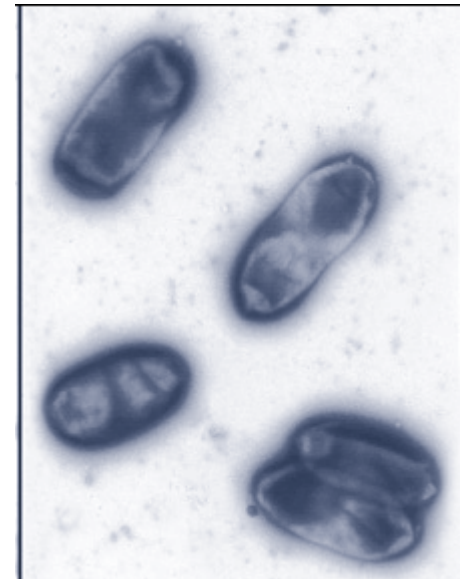
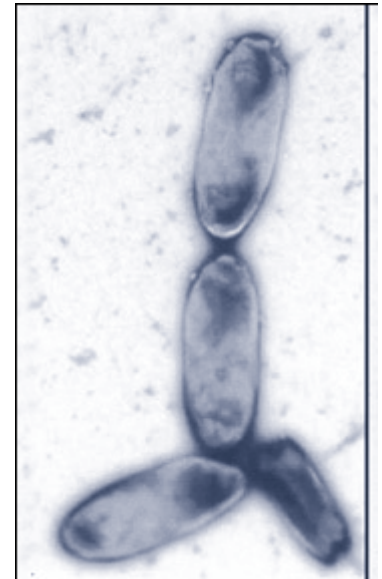
Risk of invasive Hib disease in adults with secondary immunodeficiency

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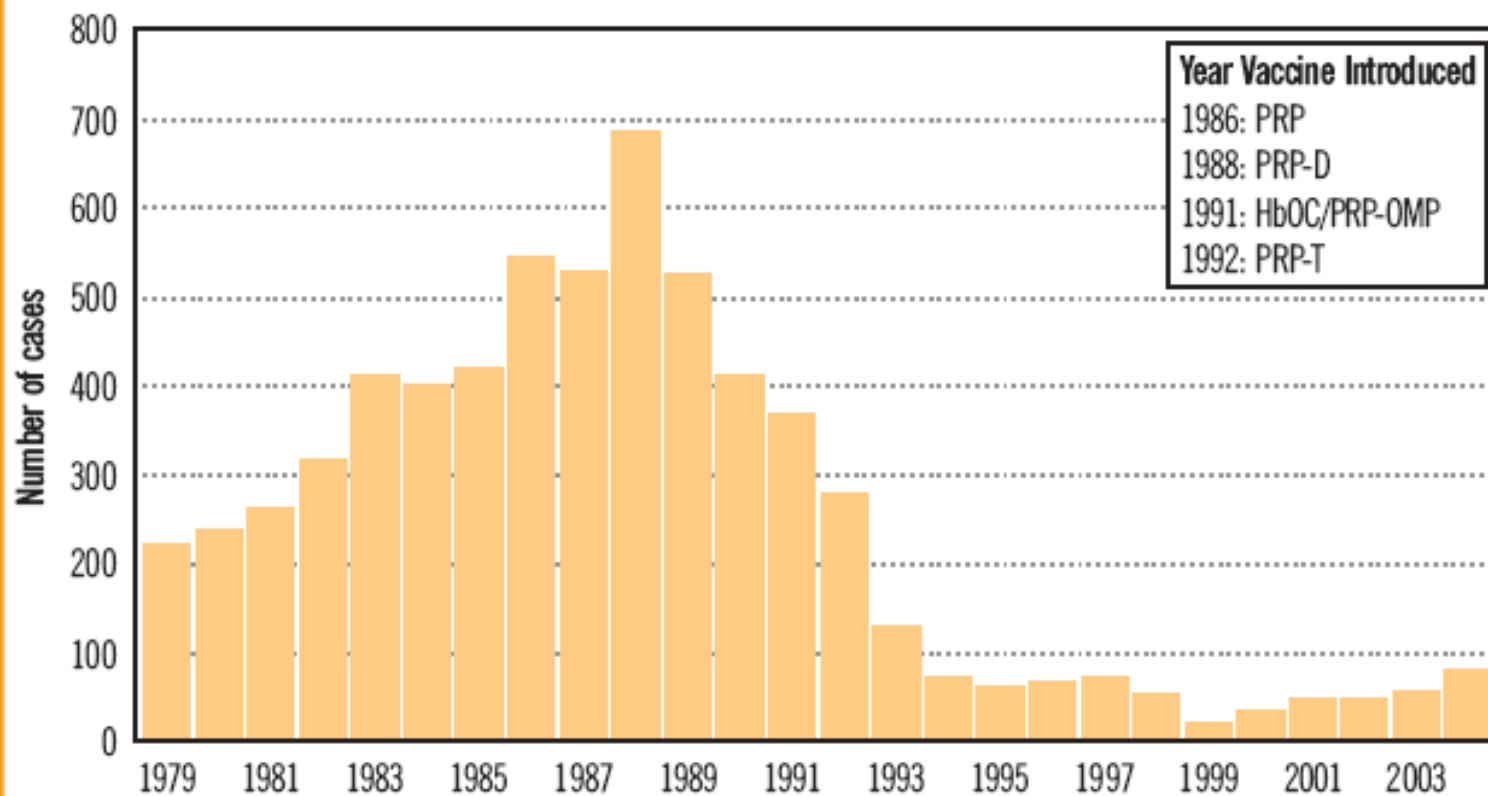
Haemophilus influenzae

- Gram-negative bacterium
- Nasopharyngeal colonization in healthy individuals
- Invasive diseases: meningitis, sepsis, and bacteremic pneumonia
- Six serotypes of encapsulated *H. influenzae*: a-f; most virulent: Hib
- Prior to introduction of Hib conjugate vaccine: Hib was the major cause of bacterial meningitis in young children



Dramatic decrease in the incidence of Hib invasive disease after vaccine introduction

Figure 3. *Haemophilus influenzae* type b (Hib) Disease —
Reported Cases, Canada, 1979–2004*



* 1979–1985: reported Hib meningitis only
1986–2004: all invasive forms (meningitis and septicemia)

Source: Public Health Agency of Canada

Hib vaccine

- Polysaccharide conjugate vaccine: highly efficient
- Circulating IgG antibody: the major defence mechanism
- Routine vaccination of all infants
- Adult vaccination is recommended for high-risk groups, e.g. asplenia, post-bone marrow transplantation, individuals with cochlear implants
- “...may be considered in other immunocompromised persons at increased risk of invasive Hib disease...”
[Canadian Immunization Guide]

Secondary Immunodeficiency States

- The immune system's ability to fight infections is compromised
- Result of infection (HIV), severe chronic organ diseases, aging, or use of immunosuppressive therapies

Chronic kidney disease

Chronic liver disease

Diabetes mellitus

Examples:

Leukemias

Multiple myeloma

Bone marrow transplantation

Cytostatic drugs, corticosteroids, *etc*

Secondary Immunodeficiency States

- Increasing numbers of individuals with secondary immunodeficiency in modern society
 - Aging population
 - Improved survival among individuals with severe diseases
 - Wide use of immunosuppressive therapies

Secondary Immunodeficiency States

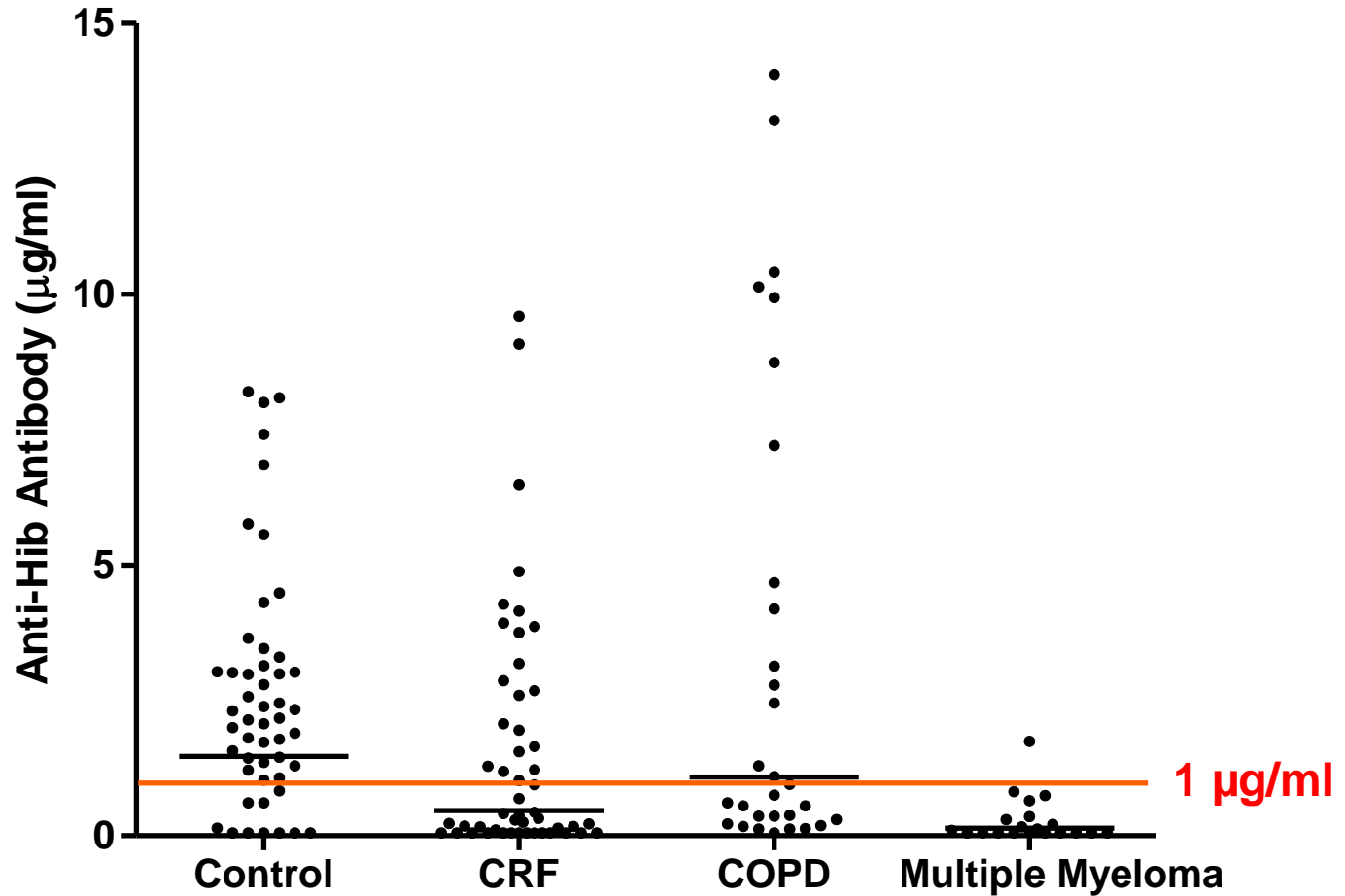
- Increasing numbers of individuals with secondary immunodeficiency in modern society
- Adult population has not been vaccinated
- **Which groups of patients with common chronic conditions are at increased risk for invasive Hib infection?**

Do patients with secondary immunodeficiency have anti-Hib antibody?

Patients: COPD
Chronic renal failure
Multiple myeloma

Group	n	Age	Range	Female
COPD	30	72	43-86	21 (70%)
Chronic Renal Failure	50	63	29-91	21 (42%)
Multiple Myeloma	20	70	43-84	9 (45%)
Controls	50	51	26-77	31 (62%)

Serum antibody against Hib



GMC
(µg/ml)

1.47

0.47

0.98

0.14

**Subjects having
protective
antibody**

80%

42%

47%

10%

Summary

- The majority of healthy adults (80%) have protective antibody against Hib
- More than 50% of patients with chronic renal failure and COPD and 90% of myeloma patients lack protective antibody against Hib
- Those are at an increased risk of invasive *H. influenzae* type b disease if exposed to the pathogen

Do patients with chronic renal failure respond to pediatric Hib vaccine?

34 patients on
haemodialysis

20 males and 14 females

25% First Nations

Age 26-91, median 65

Type 2 DM in 59%

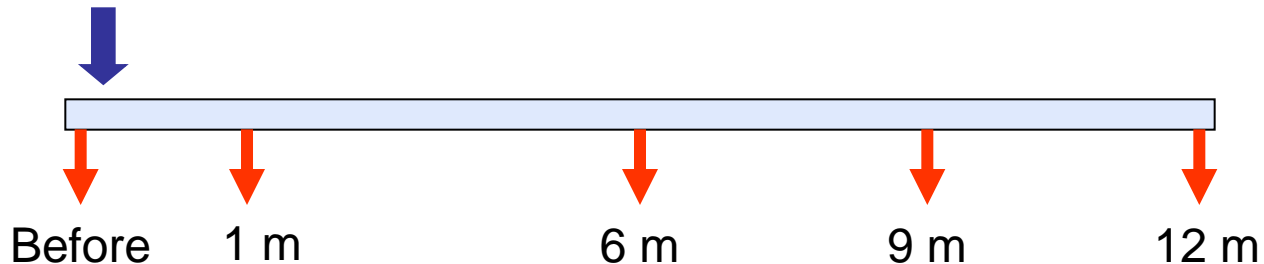
19 healthy
controls

6 males and 13 females

16% First Nations

Age 24-80, median 54

Act-HIB



Do patients with chronic renal failure respond to pediatric Hib vaccine?

- Yes: excellent response

97% of patients acquire protective antibody

Poster
presentation
by Nicole
Hawdon

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- The antibodies are functionally active

Pre-vaccine: **only 24%** of patients have
serum bactericidal activity

Post-vaccine: **90%**

Poster
presentation
by Eli Nix

Results of our vaccination study

- One dose of pediatric vaccine has stimulated functionally active antibody against Hib in most patients with chronic renal failure
- The antibodies mediate complement-dependent bacterial killing and hence are protective

Conclusions

- Adult patients with chronic renal failure, COPD, and multiple myeloma lack protective antibody against Hib
- Pediatric Hib conjugate vaccine is highly immunogenic in chronic renal failure patients
- Suggest adding Hib to the list of recommended immunizations in chronic renal failure

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