Community-driven *Helicobacter pylori* research in Arctic Canada: update from the CANHelp Working Group

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**H. pylori:** bacteria that infect the stomach

- What happens when someone is infected with *H. pylori*?
  - gastritis (almost all)
  - gastric ulcers (~10%)
  - stomach cancer (<1%)

H. pylori prevalence in Canada and the North

Canadian multiethnic populations
Canadian Aboriginal populations
Non-Canadian Aboriginal populations

<table>
<thead>
<tr>
<th>Area</th>
<th>Year</th>
<th>Age</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manitoba</td>
<td>1997</td>
<td>adults</td>
<td>35</td>
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Concerns about *H. pylori* in the North

- Communities in the Yukon and Northwest Territories concerned about health risks from *H. pylori* infection
  - Many people with *H. pylori* infection
  - Perceived high rates of gastric cancer
  - Aware of link between *H. pylori* and gastric cancer
  - Frequent failure of *H. pylori* therapy in the region
- Sought research to find solutions
The Canadian North *Helicobacter pylori* Working Group

- A team of community leaders, health officials, and researchers
- NWT, YT, University of Alberta
  - epidemiology, gastroenterology, microbiology, pathology, anthropology, health policy
Research program aims

- Collaborative and participatory approach to:
  - Develop public health strategies for control of *H. pylori*
  - Conduct policy analysis to identify cost-effective *H. pylori* management strategies
  - Develop knowledge exchange strategies that help northern communities understand *H. pylori* health risks, available solutions, and unsolved challenges for reducing these risks
Community projects

Old Crow, YT
- 2011 Population: 245
- 90% Vuntut Gwich’in
- Accessed only by air

Fort McPherson, NT
- 2011 Population: 792
- 80% Tetlit Gwich’in
- Accessed by air, water or road

Aklavik, NT
- 2006 Population: 590
- 90% Inuvialuit or Gwich’in Dene
- Accessed by air, water or ice-road

ISR H. pylori Project
(Tuktoyaktuk, NT)
- 2011 Population: 854
- 84% Inuvialuit, Gwich’in or Metis
- Accessed by air, water or ice-road
Community project components

- **Screening for *H. pylori* infection**
  - urea breath test (UBT)

- **Structured interviews**
  - health history and potential risk factors, exposures

- **Endoscopy**
  - gastric biopsies for histopathological and microbiological examination

- **Treatment trial**
  - to estimate effectiveness of alternative therapies

- **Knowledge exchange**

- **Policy development**
# Data collection

<table>
<thead>
<tr>
<th>Category</th>
<th>TOTAL from all communities</th>
</tr>
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<tr>
<td>Participants</td>
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<tr>
<td>Screened for <em>H. pylori</em> by UBT</td>
<td>847</td>
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<td>Health history data</td>
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<tr>
<td>Individual-level socio-environmental exposures data</td>
<td>655</td>
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<tr>
<td>Household-level socio-environmental exposures</td>
<td>406</td>
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<tr>
<td>Endoscopies</td>
<td>323</td>
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<td>Enrolled in treatment trials</td>
<td>256</td>
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High *H. pylori* prevalence in participant communities

- *H. pylori* prevalence across all communities: 60% (95%CI: 57-64%)
- Aklavik: 58% (194/332)
- Old Crow: 68% (126/186)
- Tuktoyaktuk: 57% (58/102)
- Fort McPherson: 59% (117/199)
H. pylori prevalence in Canada and the North

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60% decrease in prevalence from 1997 to 1999.
## Histopathology
(stomach tissue changes)

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<th>Condition</th>
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<tr>
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<tr>
<td>Gastritis</td>
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<td>Mild</td>
<td>7%</td>
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<td>Moderate</td>
<td>44%</td>
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<td>Severe</td>
<td>48%</td>
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<td>Gastric atrophy</td>
<td>43%</td>
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<td>Intestinal metaplasia</td>
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Cheung et al., BMJ Open (in press)
Antibiotic resistance

Treatments:
- **3-drug therapy**: PPI + **Clarithromycin** + Amoxicillin or **Metronidazole**
- **Sequential therapy**: PPI + Amoxicillin, then PPI + **Clarithromycin** + **Metronidazole**
- **4-drug therapy**: PPI + Bismuth + Tetracycline + **Metronidazole**

Morse *et al.*, Can J GE (in press)
Treatment trial success rates

Treatments:
- **3-drug therapy**: PPI + Clarithromycin + Amoxicillin or Metronidazole
- **Sequential therapy**: PPI + Amoxicillin, then PPI + Clarithromycin + Metronidazole
- **4-drug therapy**: PPI + Bismuth + Tetracycline + Metronidazole

• Trials:
  - **Aklavik**: 3-drug vs Sequential
  - **Old Crow, Tuktoyaktuk, Fort McPherson**: Sequential vs 4-drug

• Treatment success:
  - **3-drug**: 60% (95%CI: 45-74%) (29/48)
  - **Sequential**: 73% (95%CI: 62-82%) (57/78)
  - **4-drug**: 97% (95%CI: 85-100%) (33/34) Morse *et al.*, Can J GE (in press)
Ongoing studies

- **Epidemiological studies**
  - associations between clinical results and risk factors

- Some interesting preliminary findings:
  - **Environmental exposures**:
    - exposure to mice/mouse droppings
    - may be associated with *increased* *H. pylori* prevalence
    - but low frequencies of exposure to mice indicates high prevalence of infection in these communities is not due to transmission through mice

- **Household-level risk factors**:
  - increasing # of children in the house
    - associated with *increasing* odds of *H. pylori* infection

  - increasing highest education of household member
    - associated with *decreasing* odds of *H. pylori* infection
Ongoing studies

- **Anthropological studies**
  - How the *H. pylori* and the project is viewed by community members

- **Microbiological analyses**
  - Examining the bacteria themselves
  - Looking for potential environmental reservoirs

- **Policy analyses**
  - Cost-effectiveness study

- **Examination of knowledge exchange strategies**

- **Long-term follow-up**
  - Offering follow-up endoscopies to see if there are changes in the stomach over the long-term, and after elimination of the infection
Conclusions

• CANHelp community projects reveal a high prevalence *H. pylori* infection and *H. pylori*-associated disease in Canadian Arctic communities
  - High prevalence of severe gastritis and gastric atrophy indicates elevated risk of gastric cancer

• Results from this multidisciplinary program will increase understanding of multiple aspects of *H. pylori* infection in northern communities

• Project findings will inform development of strategies for managing *H. pylori* infection at regional/territorial levels
• Past and present members of Karen Goodman’s group and the CANHelp Working Group

• Institute of Aboriginal Peoples’ Health
• Network Environments for Aboriginal Health Research
  • Anisnabe Kekendazone, Ottawa
  • Nasivvik, Universite Laval
with Canadian Association for Gastroenterology & Industry Partners