Unwanted souvenirs
Food-borne infection in the returning traveller

Nick Beeching
Senior Lecturer in Infectious Diseases
Liverpool School of Tropical Medicine
Disclosure: frequent traveller
William Osler

“Dysentery...has been more fatal to armies than powder and shot”

Principles & practice of medicine. 1892
Traveller’s diarrhoea

“Travel broadens the mind and loosens the bowels”

S Gorbach
Plan of talk

• Travelling food
• Travelling people
• Returning travellers
  – Data
  – Cases
• Conclusions
Cases
7 diners in Denmark

3 weeks after communal meal:
Periorbital oedema
Diarrhoea
Abdominal pain
Muscle pain

Very high eosinophilia

Raised muscle creatine kinase
Q3. What is the most likely diagnosis?

1. Hookworm infection
2. Leptospirosis
3. Sarcocystis
4. Strongyloidiasis
5. Trichinosis
Q4. What is the most likely food to be responsible?

1. Sausage
2. Salted fish
3. Shellfish
4. Soft cheese
5. Strawberries
ProMED Summary of Trichinellosis Outbreaks (2001-2005)

Romania

TRICHINELLOSIS - DENMARK EX ROMANIA
1 Apr 2004
Statens Serum Institute website

Trichinellosis from imported meat, Denmark. Seven cases of trichinellosis were diagnosed in people who had eaten home-made sausage bought in Romania. The sausage was made from a home-slaughtered pig. The patients developed periorbital edema after 3 weeks with diarrhea, abdominal pains, and muscle pain. The patients had elevated eosinophil counts and creatine kinase levels. Contacts in Romania had been treated for trichinellosis after eating meat from the same pig.

Promed: Trichinellosis infection in meat imported from eastern Europe is well-known. Until veterinary control of home-slaughtered animals is commonly enforced, imported home-made food from these countries poses a potential risk. Eosinophils are white blood cells whose numbers are often elevated in helminthic infections, and elevated levels of the muscle enzyme creatine kinase reflect the inflammatory response in the muscles. - Mod.EP

TRICHINELLOSIS, DENMARK EX ROMANIA: Follow-up Report
Steve Berger
mberger@map.tau.ac.il

Background data on trichinellosis in Romania
26 April 2013
Argentina
Smoked wild boar
30 people with
trichinellosis

At least 30 people in San Martín de los Andes [Neuquen province] became ill with trichinellosis after eating smoked boar meat. Health authorities have issued an alert as they do not rule out more cases in the coming hours.

Fernanda Hadad, regional epidemiologist, noted that the 1st case consulted the local hospital some days ago and that the possibility of trichinellosis had been suspected immediately. The suspected meat product was analyzed by artificial digestion and enzyme immunoassay, which was positive for _Trichinella_ in a batch of homemade smoked boar meat.
> 100 travellers from Tioman Island, Malaysia
Q5. Which infection is NOT associated with consumption of pig products?

1. Brucellosis
2. Cysticercosis
3. Hepatitis E
4. Listeriosis
5. Shigellosis
45 year old female South African in 2005 with 4 seizures in 6 hours

Brought up in Rural Transkei
Arrived UK 1987, last visit home 4 months previously

Generally well with 4 children
4 weeks: minor cervical adenopathy
3 days: mild swelling of wrist

Presented as emergency with generalised convulsions
Next day

Extubated and alert

MR scan reviewed:

Right frontal lesion
Progress

Radiologist thought TB or cysticercosis*

FBC: no eosinophilia
HIV and syphilis serology negative
Patient alert, on phenytoin

Points so far

- Not all food-borne illness is gastrointestinal
- Parasites travel in food as well as humans
- Clinical incubation periods may be prolonged after travel
- Eosinophilia usually means worms/flukes
Travellers
What risks?
Risk to traveller - 1 month in tropics

- Any health problem 55%
- Travellers diarrhoea 35%
- Malaria (W Africa, no prophylaxis) 2%
- Giardiasis 0.6%
- Hepatitis 0.45%

Steffen R 1988
Incidence/month of health problems during a stay in developing countries – 2005

- Traveler's diarrhea: 30 - 80%
- ETEC diarrhea: 10%
- Malaria (no chemoprophylaxis, West Africa): 1%
- Influenza A or B: 0.1%
- PPD conversion: 0.1%
- Dengue infection (SE-Asia): 0.1%
- Typhoid (South Asia, e.g. India): 0.1%
- Animal bite with rabies risk: 0.1%
- Hepatitis B (expatriates): 0.1%
- Hepatitis A: 0.1%
- Typhoid (other areas): 0.001%
- Legionella infection: 0.001%
- Cholera: 0.001%
- Meningococcal disease: 0.0001%

Steffen R
NECTM 2006
Incidence/month of health problems during a stay in developing countries – 2005

- traveler’s diarrhea: 30 - 80%
- ETEC diarrhea: 10%
- malaria (no chemoprophylaxis West Africa)
- influenza A or B: 1%
- PPD conversion
- dengue infection (SE-Asia)
- animal bite with rabies risk
- hepatitis B (expatriates)
- hepatitis A
- typhoid (South Asia, e.g. India)
- typhoid (other areas)
- legionella infection
- cholera
- meningococcal disease: 0.0001%
- hepatitis B (Africa, South America)
- HIV-infection: 0.01%
- legionella infection

Steffen R
NECTM 2006
Risk to travellers - hepatitis A

• Unprotected travellers to:
  
  Low endemic area 1.5/1000/journey  
  High endemic area 80/1000/journey  

• Type of traveller:
  
  Business etc 3/1000/month  
  Backpackers etc 20/1000/month  

Khuroo MS Int J Antimicrob Ag 2003; 21: 143-52
Hepatitis E – cruise ships

Hepatitis E outbreak on P&O liner

Hundreds of holidaymakers are being tested for Hepatitis E after an outbreak onboard P&O liner Aurora.

Seven passengers contracted the virus during an 11-week world cruise which ended in Southampton on 28 March.

All the passengers onboard were sent a letter from the Health Protection Agency requesting a blood sample.

The HPA advises that the virus, which affects the liver, can be fatal but only in rare cases. P&O said it was cooperating fully with the inquiry.

It is thought the passengers caught the virus through eating or drinking contaminated food.

SEE ALSO
- Aurora cruise fiasco to cost £26m
  15 Feb 05 | Hampshire
- Passengers leave troubled liner
  21 Jan 05 | Hampshire
- 'Bug ship' arrives home
  06 Nov 03 | Europe
- 'Worst over' on virus cruise ship
  01 Nov 03 | UK

RELATED INTERNET LINKS
- P&O Cruises
Montezuma’s revenge

- Turistas
- Aztec two step
- Pharaoh's Revenge
- Mummy's tummy
- Cairo two-step
- Delhi belly
- Malta dog
- Rangoon runs
HOW to SHIT
Around the World

THE ART OF STAYING
CLEAN AND
HEALTHY WHILE TRAVELING

Dr. Jane Wilson-Howarth

Introduction by Kathleen Meyer
Author of How to Shit in the Woods
Table 4. Estimated rates of laboratory-confirmed gastrointestinal illness per 100,000 visits abroad by residents of England, Wales and Northern Ireland: 2008

<table>
<thead>
<tr>
<th>World region of travel</th>
<th>Cases of GI illness</th>
<th>Visits by EWN residents</th>
<th>Rate/1000000 visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indian subcontinent</td>
<td>952</td>
<td>1,573,338</td>
<td>60.51</td>
</tr>
<tr>
<td>North Africa and the Middle East</td>
<td>913</td>
<td>2,475,646</td>
<td>36.88</td>
</tr>
<tr>
<td>Sub-Saharan and southern Africa</td>
<td>412</td>
<td>1,178,206</td>
<td>34.97</td>
</tr>
<tr>
<td>South America</td>
<td>76</td>
<td>262,070</td>
<td>29.00</td>
</tr>
<tr>
<td>South East Asia and Far East</td>
<td>367</td>
<td>1,339,509</td>
<td>27.40</td>
</tr>
<tr>
<td>Central America</td>
<td>52</td>
<td>325,062</td>
<td>16.00</td>
</tr>
<tr>
<td>Caribbean</td>
<td>136</td>
<td>896,691</td>
<td>15.17</td>
</tr>
<tr>
<td>Pacific</td>
<td>21</td>
<td>617,601</td>
<td>3.40</td>
</tr>
<tr>
<td>Europe</td>
<td>1,407</td>
<td>48,682,068</td>
<td>2.89</td>
</tr>
<tr>
<td>North America</td>
<td>18</td>
<td>4,072,409</td>
<td>0.44</td>
</tr>
<tr>
<td>Cruise</td>
<td>2</td>
<td>569,003</td>
<td>0.35</td>
</tr>
<tr>
<td>World†</td>
<td>4,965</td>
<td>61,994,105</td>
<td>8.01</td>
</tr>
</tbody>
</table>

Lawrence J, Jones J. Foreign travel associated illness: travellers’ diarrhoea. HPA 2010
Figure 2 Kaplan-Meier graph of diarrhoea-free survival among 1202 short-term travellers from the Netherlands to developing countries, 2006-7. Time is indicated in weeks and data censored at 7 weeks.
Figure 16.3: Decrease in odds ratio (OR) of diarrhea (relative to baseline) for increasing duration of time living in Nepal.\textsuperscript{37}

## Causes

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Asia</th>
<th>Latin America</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacterial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterotoxigenic <em>E coli</em></td>
<td>6-37%</td>
<td>17-70%</td>
<td>8-42%</td>
</tr>
<tr>
<td>Other <em>E coli</em></td>
<td>3-4%</td>
<td>7-22%</td>
<td>2-9%</td>
</tr>
<tr>
<td>Campylobacter jejuni</td>
<td>9-39%</td>
<td>1-5%</td>
<td>1-28%</td>
</tr>
<tr>
<td><em>Salmonella</em> spp</td>
<td>1-23%</td>
<td>1-16%</td>
<td>4-25%</td>
</tr>
<tr>
<td><em>Shigella</em> spp</td>
<td>0-17%</td>
<td>2-30%</td>
<td>0-9%</td>
</tr>
<tr>
<td><em>Plesiomonas shigelloides</em></td>
<td>3-13%</td>
<td>0-6%</td>
<td>3-5%</td>
</tr>
<tr>
<td><em>Aeromonas</em> spp</td>
<td>1-57%</td>
<td>1-5%</td>
<td>0-9%</td>
</tr>
<tr>
<td><strong>Viral</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus</td>
<td>1-8%</td>
<td>0-6%</td>
<td>0-36%</td>
</tr>
<tr>
<td><strong>Parasitic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>5-11%</td>
<td>&lt;1%</td>
<td>2-9%</td>
</tr>
<tr>
<td><em>Giardia lambia</em></td>
<td>1-12%</td>
<td>1-2%</td>
<td>0-1%</td>
</tr>
<tr>
<td><em>Cryptosporidium</em> spp</td>
<td>1-5%</td>
<td>&lt;1%</td>
<td>2%</td>
</tr>
<tr>
<td><em>Cyclospora cayetanensis</em></td>
<td>1-5%?</td>
<td>&lt;1%?</td>
<td>&lt;1%?</td>
</tr>
<tr>
<td>No pathogen identified</td>
<td>10-56%</td>
<td>24-62%</td>
<td>15-53%</td>
</tr>
</tbody>
</table>
## Causes

<table>
<thead>
<tr>
<th></th>
<th>Asia</th>
<th>Latin America</th>
<th>Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacterial</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterotoxigenic <em>E. coli</em></td>
<td>6–37%</td>
<td>17–70%</td>
<td>8–42%</td>
</tr>
<tr>
<td>Other <em>E. coli</em></td>
<td>3–4%</td>
<td>7–22%</td>
<td>2–9%</td>
</tr>
<tr>
<td><em>Campylobacter jejuni</em></td>
<td>9–39%</td>
<td>1–5%</td>
<td>1–28%</td>
</tr>
<tr>
<td><em>Salmonella spp</em></td>
<td>1–23%</td>
<td>1–16%</td>
<td>4–25%</td>
</tr>
<tr>
<td><em>Shigella spp</em></td>
<td>0–17%</td>
<td>2–30%</td>
<td>0–9%</td>
</tr>
<tr>
<td><em>Plesiomonas shigelloides</em></td>
<td>3–13%</td>
<td>0–6%</td>
<td>3–5%</td>
</tr>
<tr>
<td><em>Aeromonas spp</em></td>
<td>1–57%</td>
<td>1–5%</td>
<td>0–9%</td>
</tr>
<tr>
<td><strong>Viral</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus</td>
<td>1–8%</td>
<td>0–6%</td>
<td>0–36%</td>
</tr>
<tr>
<td><strong>Parasitic</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Entamoeba histolytica</em></td>
<td>5–11%</td>
<td>&lt;1%</td>
<td>2–9%</td>
</tr>
<tr>
<td><em>Giardia lambia</em></td>
<td>1–12%</td>
<td>1–2%</td>
<td>0–1%</td>
</tr>
<tr>
<td><em>Cryptosporidium spp</em></td>
<td>1–5%</td>
<td>&lt;1%</td>
<td>2%</td>
</tr>
<tr>
<td><em>Cyclospora cayetanensis</em></td>
<td>1–5%?</td>
<td>&lt;1%?</td>
<td>&lt;1%?</td>
</tr>
<tr>
<td>No pathogen identified</td>
<td>10–56%</td>
<td>24–62%</td>
<td>15–53%</td>
</tr>
</tbody>
</table>
26 year old male UK resident

- Returned from 2 week holiday in Thailand
- Diarrhoea and headache for 5 days starting on last day
- Unwell, Temp 39.5 P 90 BP 110/60 RR 18
- Diagnosis - Possible enteric fever
- Blood & faecal cultures etc awaited
Q6. Which antimicrobial would you give him?

1. Azithromycin
2. Ceftriaxone
3. Chloramphenicol
4. Ciprofloxacin
5. Nalidixic acid
New map
• To show NAR/resistance from Bhan et al
La
ncet 2005

Typhoid drug resistance

Figure: Global distribution of antimicrobial resistance in Typhi (1990–2004)
Adapted from Parry and colleagues* and updated on basis of data from past 3 years.
21% of 492 isolates
nalidixic acid resistant
Correlated with
ciprofloxacin
treatment failure
Linked to travel:
Egypt (OR 5.3)
Spain (OR 3.08)
Thailand (OR 17.51)
6 resistant to ceftriaxone

Foreign Travel and
Decreased
Ciprofloxacin
Susceptibility in
Salmonella enterica
Infections

Manar Al-Mashhadani, Robert Hewson,
Roberto Vivancos, Alex Keenan, Nick J.
Beeching, John Wain, and Christopher M. Parry

To determine antimicrobial drug resistance patterns,
we characterized nontyphoidal Salmonella enterica strains
isolated in Liverpool, UK, January 2003 through December
2009. Decreased susceptibility to ciprofloxacin was found
in 103 (20.9%) of 492 isolates. The lower susceptibility was
associated with ciprofloxacin treatment failures and with
particular serovars and phage types often acquired during
foreign travel.

EID 2011; 17: 123-5
Virus ship docks in Southampton

A luxury cruise ship has returned to port a day early after 200 passengers were struck down with a vomiting virus.

The Sea Princess docked in Southampton, missing out the intended destination of Lisbon, to allow extra time to disinfect the ship.

A 30% refund has been offered to the 2,258 passengers on the seven-day trip, and Princess Cruises said fewer than eight people were still sick.

But passengers leaving the ship have reacted angrily to the offer.

Suzanne Wilson, 44, from Radstock, near Bath, who was on board with her husband Philip and two children, told the BBC: "It was very, very unpleasant.

"We were kept in our cabins, we couldn't go ashore, we couldn't go out on the ship. I'm just very, very angry.

"It was a holiday from hell. That's not even describing it. It was worse than that.

Philip Wilson
Travellers’ diarrhoea morbidity

- Affects 20-50% travellers
  - 7% N Europe, 20% S Europe, >20% elsewhere
  - Local pathogens seasonal eg ETEC autumn in Morocco (Finnish), summer in Mexico (US)
  - Usually in first 2 weeks of travel
- All groups of travellers
- Affects British more than N American or Scandinavian tourists
- Change of itinerary in 40%
- Confined to bed for at least one day 20%
- Admitted to hospital ~ 1%
- Low mortality

Al Abri SS et al LID 2005
Irritable bowel syndrome

- Recognised to be more common after bacterial gastroenteritis
- Relationship to protozoa less clear
  - ? Blastocystis hominis & Dientamoeba fragilis
- Two conflicting American studies
- Recent study in Israeli tourists

Irritable bowel syndrome after TD

Table 1. Studies of postinfectious irritable bowel syndrome among military and other traveller populations (alphabetical order)

<table>
<thead>
<tr>
<th>Study</th>
<th>Year</th>
<th>Study size</th>
<th>Follow-up (months)</th>
<th>Origin of traveller</th>
<th>IBS diagnosis</th>
<th>Study type</th>
<th>IBS risk in exposed/unexposed (%)</th>
<th>Effect estimate (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ilnyckyj et al. [62]</td>
<td>2003</td>
<td>110</td>
<td>3</td>
<td>Canada</td>
<td>Rome I</td>
<td>Cohort</td>
<td>4.2/1.6</td>
<td>RR 2.5 (0.41)</td>
</tr>
<tr>
<td>Okhuysen et al. [61]</td>
<td>2004</td>
<td>101</td>
<td>6</td>
<td>US</td>
<td>Rome II</td>
<td>Cohort</td>
<td>12.7/2.6</td>
<td>OR 5.5 (0.09)</td>
</tr>
<tr>
<td>Pitzurra et al. [64]</td>
<td>2011</td>
<td>2476</td>
<td>6</td>
<td>Switzerland</td>
<td>Rome III</td>
<td>Cohort</td>
<td>3.1/0.7</td>
<td>OR 3.0 (&lt;0.05)</td>
</tr>
<tr>
<td>Porter et al. [60]</td>
<td>2011</td>
<td>527</td>
<td>NA</td>
<td>US</td>
<td>ICD-9</td>
<td>Case–control</td>
<td>17.4/3.6</td>
<td>OR 6.3 (&lt;0.001)</td>
</tr>
<tr>
<td>Stermer et al. [59]</td>
<td>2006</td>
<td>405</td>
<td>6</td>
<td>Israel</td>
<td>Rome II</td>
<td>Cohort</td>
<td>13.6/2.4</td>
<td>RR 5.2 (&lt;0.0001)</td>
</tr>
<tr>
<td>Trivedi et al. [63]</td>
<td>2011</td>
<td>120</td>
<td>6</td>
<td>US</td>
<td>Rome II</td>
<td>Cohort</td>
<td>17.2/3.7</td>
<td>OR 5.4 (0.12)</td>
</tr>
</tbody>
</table>

ICD-9, International Classification of Disease; NA, not applicable; NOS, not otherwise specified; OR, odds ratio; RR, relative risk.

Irritable bowel syndrome after TD

<table>
<thead>
<tr>
<th>IBS risk in exposed/unexposed (%)</th>
<th>Effect estimate (P value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2/1.6</td>
<td>RR 2.5 (0.41)</td>
</tr>
<tr>
<td>12.7/2.6</td>
<td>OR 5.5 (0.09)</td>
</tr>
<tr>
<td>3.1/0.7</td>
<td>OR 3.0 (&lt;0.05)</td>
</tr>
<tr>
<td>17.4/3.6</td>
<td>OR 6.3 (&lt;0.001)</td>
</tr>
<tr>
<td>13.6/2.4</td>
<td>RR 5.2 (&lt;0.0001)</td>
</tr>
<tr>
<td>17.2/3.7</td>
<td>OR 5.4 (0.12)</td>
</tr>
</tbody>
</table>

RR, relative risk.

Points

- Travellers diarrhoea is common
- Pathogens vary with area visited
- Resistance is increasing
- Viruses are underestimated
- Post travel irritable bowel syndrome may be a chronic sequel
Returned travellers
42,173 returning travellers

GeoSentinel surveillance of illness in returned travellers, 2007-2011

• 53 tropical/travel disease units in 24 countries
• Most illness was:
  – gastrointestinal (34.0%)
  – febrile (23.3%)
  – dermatologic (19.5%)

A global study of pathogens and host risk factors associated with infectious gastrointestinal disease in returned international travellers

Ashwin Swaminathan a, n, Joseph Torresi b, c, *, o, Patricia Schlagenhauf d, p, Karin Thursky e, q, Annelies Wilder-Smith f, r, Bradley A. Connor g, r, Eli Schwartz h, i, r, Frank vonSonnenberg j, r, Jay Keystone k, l, r, Daniel P. O’Brien e, m, o, for the GeoSentinel Network
Infectious gastrointestinal disease

- 7,442/25,867 returned travellers (29%)
- associated significantly with
  - female sex (OR: 1.11; p=0.001)
  - younger age group
  - Attending a pre-travel medical appointment (OR: 1.28; p < 0.0001)
  - travelling for the reason of tourism
Infectious gastrointestinal disease

- Travelling for longer periods (>28 days) was associated with lower risk (OR: 0.93; P=0.04)
- Of the 2902 clinically significant pathogens
  - 65% were parasitic
  - 31% bacterial
  - 3% viral
- Presentation of IGD by specific pathogen varied markedly dependent on geographic region of recent travel and reason for travel
Table 2  Rates (per 1000 returned unwell travellers) of the most frequently isolated pathogens.

<table>
<thead>
<tr>
<th>Clinically significant IGD pathogen</th>
<th>n</th>
<th>% Total</th>
<th>Rate per 1000 returned travellers$^a$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giardia</td>
<td>810</td>
<td>27.9</td>
<td>31.3</td>
</tr>
<tr>
<td>Campylobacter</td>
<td>384</td>
<td>13.2</td>
<td>14.8</td>
</tr>
<tr>
<td>Entamoeba histolytica</td>
<td>363</td>
<td>12.5</td>
<td>14.0</td>
</tr>
<tr>
<td>Shigella</td>
<td>182</td>
<td>6.3</td>
<td>7.0</td>
</tr>
<tr>
<td>Strongyloides</td>
<td>176</td>
<td>6.1</td>
<td>6.8</td>
</tr>
<tr>
<td>Salmonella spp. other</td>
<td>134</td>
<td>4.6</td>
<td>5.2</td>
</tr>
<tr>
<td>Dientamoeba fragilis</td>
<td>116</td>
<td>4.0</td>
<td>4.5</td>
</tr>
<tr>
<td>Ascaris</td>
<td>110</td>
<td>3.8</td>
<td>4.3</td>
</tr>
<tr>
<td>S. typhi</td>
<td>99</td>
<td>3.4</td>
<td>3.8</td>
</tr>
<tr>
<td>Hookworm</td>
<td>71</td>
<td>2.4</td>
<td>2.7</td>
</tr>
<tr>
<td>Tapeworm</td>
<td>71</td>
<td>2.4</td>
<td>2.7</td>
</tr>
<tr>
<td>Pathogen</td>
<td>Percentage</td>
<td>Confidence Interval</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>------------</td>
<td>---------------------</td>
<td></td>
</tr>
<tr>
<td>Hepatitis A virus</td>
<td>67</td>
<td>2.3 - 2.6</td>
<td></td>
</tr>
<tr>
<td>Trichuris trichura</td>
<td>52</td>
<td>1.8 - 2.0</td>
<td></td>
</tr>
<tr>
<td>S. paratyphi</td>
<td>47</td>
<td>1.6 - 1.8</td>
<td></td>
</tr>
<tr>
<td>C. difficile</td>
<td>38</td>
<td>1.3 - 1.5</td>
<td></td>
</tr>
<tr>
<td>Enterobius</td>
<td>36</td>
<td>1.2 - 1.4</td>
<td></td>
</tr>
<tr>
<td>Cryptosporidium</td>
<td>32</td>
<td>1.1 - 1.2</td>
<td></td>
</tr>
<tr>
<td>Cyclospora</td>
<td>31</td>
<td>1.1 - 1.2</td>
<td></td>
</tr>
<tr>
<td>Hepatitis E virus</td>
<td>32</td>
<td>1.1 - 1.2</td>
<td></td>
</tr>
<tr>
<td>Yersinia spp. (non-pestis)</td>
<td>20</td>
<td>0.7 - 0.8</td>
<td></td>
</tr>
<tr>
<td>Clonorchis</td>
<td>19</td>
<td>0.7 - 0.7</td>
<td></td>
</tr>
<tr>
<td>Fasciola</td>
<td>5</td>
<td>0.2 - 0.2</td>
<td></td>
</tr>
<tr>
<td>Trichomonas intestinalis</td>
<td>4</td>
<td>0.1 - 0.2</td>
<td></td>
</tr>
<tr>
<td>Isospora</td>
<td>3</td>
<td>0.1 - 0.1</td>
<td></td>
</tr>
<tr>
<td>V. cholerae</td>
<td>1</td>
<td>0.0 - 0.0</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2902</strong></td>
<td><strong>100</strong></td>
<td><strong>112.2</strong></td>
</tr>
</tbody>
</table>
Risk areas
Parasitic infections

Key: Giardia   Entamoeba Histolytica   Strongyloides   Ascaris   Dientamoeba fragilis   Hookworm   Tapeworm   Other (<5.5)
Risk areas
Bacterial infections

Key:
- Campylobacter
- Shigella
- Salmonella (other)
- Salmonella typhi
- Salmonella paratyphi
- Clostridium Dificile
- other (<5.5)
Risk groups
Bacterial infections

- Campylobacter
- Salmonella typhi
- Shigella
- Salmonella paratyphi
- Salmonella (other)
- Clostridium difficile
Frequent flyer - mid April 2012

- 62 yr old single British male
- Market stall owner
- Annual trips India/SE Asia

- UK - Thailand early Jan 2012 3 weeks (BKK)
- Then Delhi overland to Goa stayed 5 weeks
- Returned UK early March
- Unwell 3 weeks after arriving in Thailand

- Past history
  L hemicolecetomy + chemo in 2007 for Duke B cancer
  Yearly surveillance colonoscopy normal Dec 2011
Illness

• Recurrent attacks of
• Fever, diarrhoea, abdominal pain

• 3 courses of metronidazole (7 days each)
• Relief for 1 week each time
• Further course of metronidazole in UK
• Admitted local hospital
UK hospital

- Off antibiotics 2 weeks
- Diarrhoea 10x in 24 hours
- Mucus & blood
- Minimal abdominal pain
- No systemic fever
- Weight loss 6-7 kg
- Lethargy
Examination

- Afebrile
- Bit thin, unwell & fed up
- Laparotomy scar
- No haemorrhoids
- Empty rectum

- Blood streaked mucousy stools
Initial tests

- Hb 11.6
- Platelets 693
- White cells 12.2 Neuts 9.6 Eos 0.2
- CRP 17
- Albumin 30 Total protein 59
- Liver function tests normal
- Faecal cultures negative
Q7. What is the most likely diagnosis?

1. Amoebiasis
2. *Clostridium difficile*
3. Colonic cancer recurrence
4. Inflammatory bowel disease
5. Shigellosis
Q8. What investigation should be next?

1. Amoebic serology
2. Sigmoidoscopy
3. Stool for culture
4. “Hot stool” for microscopy
5. Stool for OCP
Hot stool microscopy
Diagnosis

• *Entamoeba histolytica* recurrences

• Why?
  – Resistance
  – Inadequate doses
  – Vegetative forms not treated
  – Underlying pathology

• Treatment: prolonged tinidazole & diloxanide
Learning points

- Thrombocytosis may be linked with infectious colitis (C difficile, amoeba)
- Hot stool examination is very rarely indicated
- But must be “hot” when it is!
- Failure of treatment for amoebiasis may be multifactorial
Final Case
49 year old British engineer

Africa 1975 – 1988

Feb 1988  Diarrhoea  
Weight loss 35kg  
Infected toenails

Mar 1988  Erythema multiforme after griseofulvin

Apr 1988  HIV+  
Anaemia

Transfer Liverpool
Profuse diarrhoea

6 of these daily (1 – 1.5 L)
Faecal microscopy

Wet prep

Auramine
Q9. What is the pathogen shown?

1. *Balantidium coli*
2. *Cryptosporidium hominis*
3. *Cyclospora cayetanensis*
4. *Giardia lamblia*
5. *Isospora belli*
Isospora belli

**FIGURE 4.6** (1) Immature oocyst of *Isospora belli*, (2) mature oocyst of *I. belli*. (Illustration by Nobuko Kitamura.)
Isospora

Mature oocysts with sporozoites

Immature oocysts with sporocysts

Immature oocysts with sporoblasts

Oocysts in feces

\( i \) = Infective Stage

\( d \) = Diagnostic Stage

CDC

http://www.dpd.cdc.gov/dpdx

ESCMID Online Lecture Library © by author
Isospora
Q10. What is the first-line treatment for isosporiasis?

1. Ciprofloxacin
2. Cotrimoxazole
3. Metronidazole
4. Nitazoxanide
5. Praziquantel
Isosporiasis

- Throughout tropics
- Typically 10 - 20% of HIV related diarrhoea in tropics
- No known animal host
- Possible biliary carriage

- Responds to cotrimoxazole (or ciprofloxacin)
- Secondary antibiotic prophylaxis needed unless HAART given
Final points

• Persistent gastrointestinal symptoms in returned travellers are often parasitic
• Especially in immunosuppressed patients
• Use appropriate diagnostic techniques
  – Hot stool only for amoebic infection
  – Don’t ignore things you don’t recognise
• New molecular diagnostic modalities will help diagnosis
Be careful out there...