Why We Study Medical Parasitology

ITS IMPORTANCE IN MEDICAL EDUCATION

By Prof. (Dr. of Med.) Charles McWilliams © 2009

Chancellor, Knights Hospitaller School of Medicine; Dean - Panamerican School of Natural Medicine http://smokh.org/medschool.html

Our duties as doctors anywhere in the world no longer allow us to defray from our studies of tropical diseases. Since large segments of the populations of Europe and North America host huge immigrant populations, rarities of isolated cases of dengue, hookworm, giardiasis, amoebiasis, and others can no longer be considered a given. Further, as restaurant workers proliferate from such populations, fecal-finger transmission is now very prevalent, and can transmit guests into normally healthy hosts with little signs or symptoms, as if ghosts. An afternoon belly ache with a little loose stool after the $3.99 pizza or salad bar; $1.99 submarine sandwich; or $.99 taco, is cause for alarm. Infection is a given and latent infection after the mop up is confirmatory until proven otherwise (microscopically speaking). Popular media seems to take delight in advising the public of salmonella outbreaks in alfalfa sprouts and peanut butter, but tells you next to nothing of rampant parasitical infections raging and ravaging in so called civilized societies, accounting for a significant proportions of subclinical illnesses and at cause for seemingly insignificant *chief complaints,* like headache, backache, polyuria, reflux esophagitis, hemorrhoids, and irritable bowel.

Parasites are a concern right here in North America because so many factors, including international travel, importation of food stuffs, illegal immigration, etc. expose us to these unseen invaders. Contaminated food handlers are one of the biggest vectors of parasites. Other unsuspected sources are exotic, undercooked foods like sushi and pork barbecue; household flies as routine vectors; and municipal water supplies are often contaminated. And according to the New England Journal of Medicine, humans can become infected with at least thirty parasitic illnesses from their pets alone. Most municipal water supplies in the U.S. today are home to protozoa like Giardia and Cryptosporidium and one in five Americans drinks water that violates federal health standards.

The Basics of Parasites

Parasites are classified based on a variety of aspects of their interactions with their hosts and on their life cycles.

Those that live on its surface are called *ectoparasites* (e.g. mites) and those that live inside the host are called *endoparasites* (e.g. hookworms). Endoparasites can exist in one of two forms: intercellular (inhabiting spaces in the host's body) or intracellular (inhabiting cells in the host's body). Intracellular parasites, such as bacteria or viruses, tend to rely on a third organism which is generally known as the carrier or vector. The vector does the job of transmitting them to the host. An example of this interaction is the transmission of malaria, caused by a protozoan of the genus *Plasmodium*, to humans by the bite of an anopheline mosquito.

Parasitic worms or **helminths** are a division of eukaroytic parasites that, unlike external parasites such as lice and fleas, live inside their host. They are worm-like organisms that live and feed off living hosts, receiving nourishment and protection while disrupting their hosts' nutrient absorption, causing weakness and harboring disease microorganisms. Those that live inside the digestive tract are called intestinal parasites. They can live inside humans as well as other animals. Helminthology is the study of parasitic worms and their effect on their hosts. Parasitic worms are categorized into three groups: cestodes (flat worms), nematodes (round worms), and trematodes (fluke).

Parasitic worms are sequential hermaphrodites and reproduce depending on the species of worm, either with the presence of a male and female worm, joining sperm and eggs, producing fertile eggs, such as hookworms, or by breaking off segments that contain both male and female sex organs that are able to produce fertile eggs without the presence of a male or female (e.g. tapeworms). All worm offspring are passed on through poorly-cooked meat, especially pork, wild fish, contaminated water, faeces and mosquitoes. However, it is estimated that 40 million Americans are infected with the most common roundworm, the pinworm. Worm eggs or larvae or even their adults enter the human body through the mouth, anus, nose, or skin, with most species attaching themselves to the intestinal tract. With the presence of digestive enzymes, worm egg shells are dissolved, releasing a brand-new worm; unlike its egg shell, the parasitic worm is protected from the body's powerful digestive enzymes by producing a protective keratin layer.

Ingestion of infective eggs and cysts of fecal-oral transmissible parasites has been documented with the level of environmental and personal hygiene. The possibility of contamination of food with parasite eggs and cysts by infected food vendors has also been extensively recorded. Food-handlers with poor personal hygiene working in food-service establishments are daily potential sources of infections due to parasitic and pathogenic organisms.

Parasites have created a hidden epidemic and many practitioners don't even suspect they exist. A parasitologist once told the author that seventy to eighty percent of his patients have one or more parasites. If parasites are so prevalent, why haven't they been recognized as a leading cause of disease?

For several reasons, all of which relate to the belief that parasites are not a concern in North America. Its no fluke that the symptoms of parasitic illnesses are very similar to the symptoms of other diseases. Parasites are known as the *great masqueraders*. For example, what appears to be bacterial ulcerative colitis can actually be an amoebic infection in the colon. The acid-reflux condition so prevalent today and assumed to helicobacter pylori, may also be connected to the amoeba Giardia. Even gallbladder problems can come from protozoa or worms like ascariasis. And it's one estimation that many of those hyperactive kids on Ritalin probably needs to be dewormed before anything else. Often children come down with hyperactive symptoms when they're in day-care centers, which is another site where parasites easily spread, not only from child to child, but from sibling to parents. Other symptoms might include abdominal cramps, nausea, foul smelling rectal gas, or even a low-grade fever thought to be due to a *cold*.

The Chief of the Laboratory for Parasitic Diseases of the National Institute of Health, Dr. Frank Nova, spoke years ago to the media about the public's lack of awareness of the parasite epidemic in the Unites States. He stated that you are now much more likely to contract a parasitic infection in America than in Africa.

Common Symptoms of Parasitic Infections

- constipation or diarrhea
- chronic yeast infections

- chronic fungus on hand/toe nails or nails become brittle or lost their luster
- getting sick or catching colds often (depressed immune system)
- weight problems or rapid weight gain
- acne
- mood swings or depression
- premenstrual syndrome more intensified
- low sex drive
- lack of concentration and or short term memory problems
- sleeping problems
- being prone to diseases
- frequent headaches
- chronic urinary tract irritation/infections
- arthritic bone pains or rheumatism
- allergies
- gas - bloating - flatulence
- general weakness and frequent/chronic fatigue or lack of energy or apathy

"In terms of numbers, there are more parasitic infections acquired in this country than in Africa." ***Dr. Frank Nova, Chief of the Laboratory for Parasitic Diseases of the National Institute of Health***

"We have a tremendous parasite problem right here in the U.S., it is just not being addressed." ***Dr. Peter Wina, Chief of the Patho-Biology in the Walter Reed Army Institute of Research***

Consider these problems:

- **Pinworm infections overwhelming**

The pinworm is the most common roundworm parasite in temperate climates – even in areas with high levels of sanitation. In the United States, it is the most common of all parasitic roundworm infections, affecting up to one-third of the country's children. Because pinworm infection is spread mainly by children, it is most prevalent in family groups, day-care centers, schools, and camps.

Pinworms are small, threadlike roundworms found primarily in the colon and rectum. The life cycle of the pinworm - egg, larva, and mature worm - takes place inside the human host and requires from three to six weeks to complete. Pinworms enter the body when eggs are swallowed. The female pinworm expels thousands of eggs into the environment. Because the eggs are moist and moderately resistant to drying, they may remain infectious for several days after being disseminated in dust and can cling to the fingers of children. Exposure to infective eggs may occur when the person harboring the infection scratches the contaminated area (the area around the anus where the female worm deposits her eggs) and then transfers the eggs to the fingertips and from there to the mouth. The eggs may be scattered into the air from bed linen and clothing, and can cling to doorknobs, furniture, tubs and faucets, and even food. Although an individual may have no symptoms over a long period, there may be repeated episodes of infection. The usual symptoms in children are bellyache, bruxism, and itching rectum, with degrees of irritability and hyperactivity.

Some physicians actually believe that no treatment is necessary for pinworm infections that are asymptomatic, since children usually outgrow the infection as they grow older. The strong probability of small children becoming reinfected outside the home makes the strenuous efforts to eliminate the eggs from the household of little help unless hygienic measures are implemented. Frequent bathing; clean underclothing, night clothes, and bed sheets; and routine hand washing, particularly after using the bathroom, will help prevent pinworm infection or reinfection. Deworming with pearls of garlic as routine measure.

• Overwhelming strongyloidiasis: an unappreciated opportunistic, creeping infection.

Strongyloides stercoralis, a threadworm from from 2.0 to 2.5 mm, is an intestinal nematode which infects a large portion of the world's population. Individuals with infection confined to the intestinal tract are often asymptomatic but may have abdominal pain, weight loss, diarrhea, and other nonspecific complaints if the infection is overwhelming. Strongyloidiasis is difficult to diagnosis and stool examination with conventional techniques often fails to detect the helminth larvae. Enhanced proliferation of the parasite in compromised hosts causes an augmentation of the normal life-cycle. Resultant massive invasion of the gastrointestinal tract and lungs is termed the hyperinfection syndrome. If the worm burden is excessive, parasitic invasion of other tissues occurs and is termed disseminated strongyloidiasis. In particularly difficult situations where either worm eradication is impossible or reinfection is probable, short monthly courses of antihelminthic therapy seem to be effective in averting recurrent systemic illness. Finally, prevention of hyperinfection or dissemination due to Strongyloides stercoralis can be accomplished by screening immunocompromised hosts with stool and upper small bowel aspirate examinations.

• Pigbel disease, necrotizing enteritis, necrotizing jejunitis, enteritis necroticans

Like typhoid (enteric) fever, pigbel is much more common in the tropics, but is occasionally seen elsewhere. It is due to the beta toxins of types B and C Clostridium perfringens, which multiply in the gut following a large meal, classically a feast of barbecued pork. Clostridium perfringens forms part of the normal gut flora in humans and animals. Exhibiting frighteningly violent and rapidly progressing symptoms, *Clostridium perfringens*-induced intestinal diseases have confounded livestock producers and veterinarians around the world, along with medical doctors who at times have been stunned to diagnose in humans what is more commonly considered an animal disease.

"The organism is so promiscuous in terms of its hosts that it’s found wherever there are domestic animals," says Glenn Songer, a veterinary scientist in the College of Agriculture at The University of Arizona. "It makes a lot of toxins, and it’s almost always lethal."

The typical victim is usually a child, or a young adult, who presents with: (1) Acute toxic shock. (2) Severe colicky abdominal pain and

vomiting. (3) Constipation with foul flatus, followed by bloody diarrhea. (4) Vomiting, diarrhoea, and abdominal pain; the diarrhea stops, but vomiting continues, and his abdomen distends. (5) An obscure abdominal illness, ending in a pelvic abscess that is the result of a perforation. (6) Rectal bleeding. Upon presentation, typically, his abdomen distends and is tender all over, sometimes with a soft mass above his umbilicus. He is ill and may have a high fever. It can be misdiagnosed as acute appendicitis.

In spite of its potential danger as an infectious agent, the avirulent forms of bacillus are commonly found in the intestinal tracts of warm-blooded animals, and it also inhabits terrestrial, marine and aquatic environments. The trouble starts when the balance of bacteria in the gut is disrupted, giving *C. perfringens* a chance to proliferate unchecked. It may contaminate soil, animal feed and litter, or be transmitted directly from the infected to healthy animals, ending up in the food chain.

C. perfringens related livestock infections have been reported in every state in the nation and in most parts of the world. Although surgery can save human victims, it is often not feasible to perform it on domestic animals. The most practical way to handle perfringens-related illnesses in animals is to prevent them in the first place - *don't eat the barbecue*.

What to do?

First and foremost, we must understand mammalian gut physiology. The only normal mineral acid in the human economy is hydrochloric acid. It is the central firewall to prevent infection and parasitical infestation. The older we get, the less we generate. The more liquid that accompanies each bolus, dilutes its efforts of denaturing germs, ova and larvae. The faster one eats, the less chance that mastication will render each morsel smaller, so the acid can oxidize an offending pathogen.

Hydrochloric acid is central to the animal economy. Just because it is a simple acid, it is not to be slighted, just as seemingly mere shift of sodium in the blood can produce shock, so a chloride shift in gut acidity can wreck havoc. In health the acid/alkaline balance of the body is maintained by the normal production of hydrochloric acid in

parietal cells of the stomach, and counterbalanced by bicarbonate production in the pancreas and liver (bile). Should this production fall short of bodily necessity, symptoms arise like reflux esophagitis and constipation.

Not only does HCl render sanity, it cleaves off mineral ions otherwise chelated to carbons so they can be absorbed.

Acid-Dependent Minerals That Require Adequate Stomach Acid to Effectuate Intraluminal Absorption in the Small Intestine

Chromium, Copper, Iron, Magnesium, Manganese, Molybdenum, Selenium, Zinc

Sanitized physiology, the type you obtain in public schools, teaches that the stomach only secretes hydrochloric acid, yet other acids in gastric content were recorded in vomitus as early as the late 1800's! [http://www.ingentaconnect.com/content/bsc/hel/2007/00000012/00000005/art00008]

The fact of the matter is, the yields to gut acids as a compensatory mechanism. Gastric acids must be present to prevent infections and maintain some form of peristalsis for survival. Under normal conditions, the hydrogen ion concentration of gastric digestion reaches a near low of pH of 2, while the pancreatic juice counters with a pH of 8.8, and that of human lymph should be maintained slightly on the alkaline side. Should these day to day reactions vary too much, either on the acid or alkaline side, the patient will develop conditions known respectively as "acidosis" or "alkalosis," either of which are harmful. Should gastric production of HCl be reduced by lack of B vitamins and/or iodine, the balance must be made up. Other acids, which are the products of decomposition in the human body, such as lactic acid, uric acid and others, are called in to fill the deficiency, otherwise, huge volumes of bicarbonate are waiting in the small bowel which will disrupt the economy of the *volume conductor*. These however, being abnormal constituents of the great chemical laboratory of the human body, are ill-adapted to the requirements, for they are unable to keep in solution many of the mineral salts which must be thrown off as waste matter in bodily excretions, such as the sweat, the expired air, the urine and the faeces. In the effort of the body to provide acid of some sort, these harmful acids now become a slow death adaptation

and the condition known as "acidosis" results with symptoms of general systemic, lymphatic, and articular poisonings (i.e. arthritis).

Conversely, when the hydrogen-ion concentration of human lymph falls into the organic acid side, rather than the mineral side, due to excess production of lactic, uric, butyric, aceotoacetic, phosphoric, sulfuric acids, and like poisons, there is an effort on the part of the body to neutralize these with alkaline salts, such as calcium, sodium, potassium, and others. Often, there is chronic and latent deposition of these salts resulting in pathological calcifications (bone spurs, arthritis), or lithic deposits as in gout, gall and kidney stones, etc. These also, being foreign to bodily economy, in time produce the condition known as "toxic alkalosis," the general symptoms of which are similar to acidosis, but often attended with yeast invasion, general collapse or chronic disease like episodes of gout.

So hydrochloric acid production in the stomach is central to acid/base balance of the interstitial fluids. The yang of the stomach, is counterbalanced by the yin of the pancreatic and bilious fluids. The early symptoms of disruption of this acid-alkaline gut economy is reflux esophagitis, biliousness, peptic distress, etc. This lays open the gut to invasive parasitosis as well as gut fermentative microorganisms. The prescriptive practice of proton pump inhibitors, gastric antacids, and other nostrums for the usual gastric distress is sheer quackery and shows a pitiful understand of gastroenterology. The patient should be taught the principles of hygiene, food combining, adequate water intake, and daily bowel regulation, as well as be examined for deficiencies (iodine and iodides), and be given tablets of betaine hydrochloride to be taken at meals.

Wrap up

So there you go, from restaurant slop to mop up. Food borne illnesses are on the rise globally. These diseases are either infectious or toxic in nature caused by ingesting pathogens, worms and laravae through contaminated food or water. Every year, there are 76 million cases of foodborne illnesses in United States, two million cases in the United Kingdom, one million cases in Canada, and 750,000 cases in France. Its a day-to-day occurrence. When it comes to diagnosis, we think of parasites, *until proven otherwise.* Medical students and interns all over the world snack daily on hamburgers and hot dogs, drinking sugared coffee and smoke cigarettes, and generally haven't a clue!

That's why we study medical parasitology!

Overview of Gut Physiology lecture, now available online

http://privyinfo.org/smokhphoenix09/acidbase.html

The user **healthy** now has the password **primarycare**

Sausage Links

http://www1.agric.gov.ab.ca/$Department/newslett.nsf/all/fss13651

http://www1.agric.gov.ab.ca/$Department/newslett.nsf/all/fss13681

http://www.scielo.cl/scielo.php?pid=S0717-77122004000100008&script=sci_arttext

http://www.vnv.org.au/site/index.php?option=com_content&task=view&id=44&Itemid=55

http://sid.ir/en/VEWSSID/J_pdf/86320030103.pdf

Oral fecal parasites and personal hygiene of food handlers

http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1831884

http://www.banglajol.info/index.php/JHPN/article/viewFile/1887/1784

http://www.oznet.ksu.edu/library/fntr2/mf2171.pdf

http://www.foodsafety.gov/~mow/chap11.html

http://www.who.int/inf-pr-2000/en/pr2000-04.html

Acid matters

http://www.newswithviews.com/Howenstine/james21.htm

http://www.psychresearch.com/hydrochloric_acid_therapy.html

http://www.alternative-cancer-therapies.org/toxemia_and_alkalosis.html