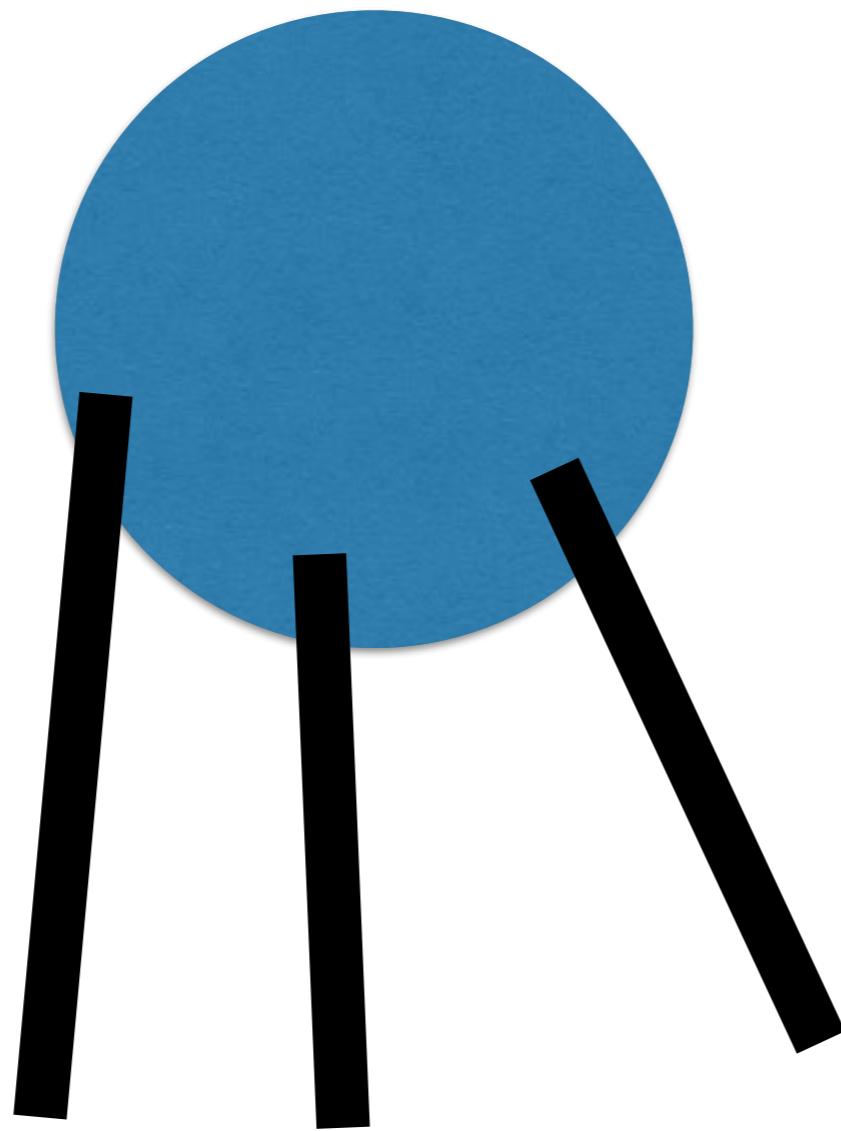


Hookworms for Autoimmune Disease

Gen-omics
The understanding of the complete genetic material of an organism.

Natur-pathics
Understanding how to influence the interaction between genetics and the environment.

It's only by understanding the genetic expectations of the organism that we can restore balance.



Mebendazole

"MBZ" redirects here. For the automobile brand abbreviated as "MBZ", see [Mercedes-Benz](#).

Mebendazole (MBZ) is a medication used to treat a number of parasitic worm infestations.^[3] This includes [ascariasis](#), [pinworm disease](#), [hookworm infections](#), [guinea worm infections](#), [hydatid disease](#), and [giardia](#), among others.^[3] It is taken by mouth.^[3]

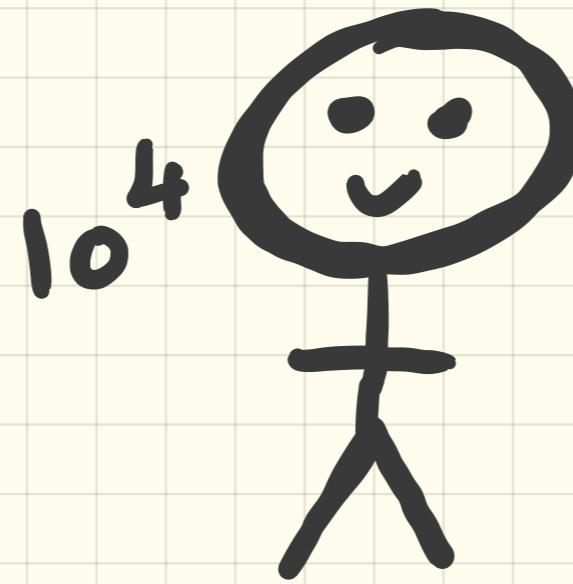
Mebendazole is usually well tolerated.^[3] Common side effects include [headache](#), [vomiting](#), and [ringing in the ears](#).^[3] If used at large doses it may cause [bone marrow suppression](#).^[3] It is unclear if it is safe in pregnancy.^[3] Mebendazole is a broad-spectrum [antihelminthic agent](#) of the benzimidazole type.^[3]

Mebendazole came into use in 1971, after it was developed in [Belgium](#).^[4] It is on the [World Health Organization's List of Essential Medicines](#), the most effective and safe medicines needed in a [health system](#).^[5] Mebendazole is available as a [generic medication](#).^[6] The wholesale cost in the [developing world](#) is between 0.004 and 0.04 USD per dose.^[7] In the United States a single dose is about 884.00 USD as of 2016, while in Australia and the UK it costs about 5 USD.^[8]

Medical use

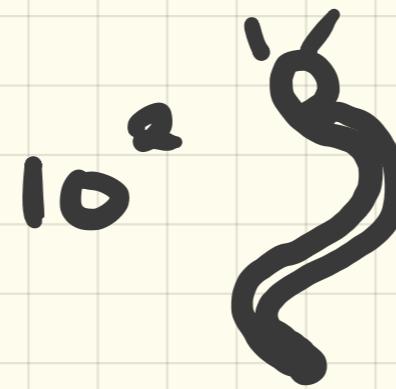
Mebendazole is a highly effective, broad-spectrum [antihelmintic](#) indicated for the treatment of [nematode](#) infestations, including roundworm, hookworm, whipworm, threadworm, pinworm, and the intestinal form of [trichinosis](#) prior to its spread into the tissues beyond the digestive tract. Other drugs are used to treat worm infections outside the digestive tract, as mebendazole is poorly absorbed into the bloodstream.^[9] Mebendazole is used alone in those with mild to moderate infestations. It kills parasites relatively slowly, and in those with very heavy infestations, it can cause some parasites to migrate out of the digestive system, leading to appendicitis, bile duct problems, or intestinal perforation. To avoid this, heavily infested patients may be treated with piperazine, either before or instead of mebendazole. [Piperazine](#) paralyses the parasites, causing them to pass in the feces.^[10] It is also used rarely in the treatment of hydatid disease. Evidence for effectiveness for this disease, however, is poor.^[11]

Mebendazole and other benzimidazole antithelminetics are active against both larval and adult stages of nematodes, and in the cases of roundworm and whipworm, kill the eggs, as well. Paralysis and death of the parasites occurs slowly, and elimination in the feces may require several days.^[9]



10^4

HUMANS
SMARTEST ;)



10^2

WORMS
Smart ::



10^1

bacteria
dumb :/

“The body of man has in itself blood, phlegm, yellow bile, and black bile; these make up the nature of the body, and through these he feels pain or enjoys health.”

Hippocrates

These ideas are provide no diagnostic utility or therapeutic guidance, Which is why you don't learn them at any medical school.

If Hippocrates can be wrong why can't we?
We learn by uncovering our weaknesses.

Effects of Hookworm on Immunotollerance In the Human Organism

Vikings could be to blame for why Scots have highest levels of multiple sclerosis in the world

- Study found one in every 170 women in the Orkney Islands suffers from multiple sclerosis
- It is the highest rate in the world and has been linked with their Norse ancestry
- Scientists say Vitamin D deficiency could also be to blame

Albendazole

From Wikipedia, the free encyclopedia

Albendazole, also known as **albendazolum**,^[1] is a medication used for the treatment of a variety of **parasitic worm infestations**.^[3] It is useful for **giardiasis**, **trichuriasis**, **filariasis**, **neurocysticercosis**, **hydatid disease**, **pinworm disease**, and **ascariasis**, among others.^[3] It is taken by mouth.^[3]

Common side effects include nausea, abdominal pains, and headaches.^[3] Potentially serious side effects include **bone marrow suppression** which usually improves on stopping the medication.^[3] Liver inflammation has been reported and those with prior liver problems are at greater risk.^[3] It is **pregnancy category C** in the United States and category D in Australia, meaning it may cause harm if taken by pregnant women.^{[3][4]} Albendazole is a broad-spectrum **antihelminthic agent** of the **benzimidazole** type.^[3]

Albendazole was developed in 1975.^[5] It is on the **World Health Organization's List of Essential Medicines**, the most effective and safe medicines needed in a **health system**.^[6] The wholesale cost in the **developing world** is between 0.01 and 0.06 USD per dose.^[7] In the United States, however, it is very expensive as of 2015 at about 201 USD per dose.^[8]

What is "chronic Lyme disease?"

Lyme disease is an infection caused by the bacterium *Borrelia burgdorferi*. In the majority of cases, it is successfully treated with oral antibiotics. Physicians sometimes describe patients who have non-specific symptoms (like fatigue, pain, and joint and muscle aches) after the treatment of Lyme disease as having post-treatment Lyme disease syndrome (PTLDS) or post Lyme disease syndrome (PLDS).

The term “chronic Lyme disease” (CLD) has been used to describe people with different illnesses. While the term is sometimes used to describe illness in patients with Lyme disease, in many occasions it has been used to describe symptoms in people who have no evidence of a current or past infection with *B. burgdorferi* (Infect Dis Clin N Am 22:341-60, 2008). Because of the confusion in how the term CLD is employed, experts in this field do not support its use (New Engl J Med357:1422-30, 2008).

How is Lyme disease treated?

For early Lyme disease, a short course of oral antibiotics such as doxycycline or amoxicillin is curative in the majority of the cases. In more complicated cases, Lyme disease can usually be successfully treated with three to four weeks of antibiotic therapy.

In patients who have non-specific symptoms after being treated for Lyme disease and who have no evidence of active infection (patients with PTLDS), studies have shown that more antibiotic therapy is not helpful and can be dangerous.

The efficacy of azathioprine for the treatment of inflammatory bowel disease: a 30 year review

. 2002 Apr; 50(4): 485–489.

[Author information](#) ► [Article notes](#) ► [Copyright and License information](#) ►

Abstract

Background: There are limited data on factors predicting response to azathioprine and uncertainty regarding the optimal duration of treatment.

Patients and methods: The notes of patients attending the Oxford IBD clinic from 1968 to 1999 were reviewed. Remission was defined as no need for oral steroids for at least three months and relapse was defined as active disease requiring steroids.

Results: A total of 622 of 2205 patients were treated with azathioprine (272 Crohn's disease, 346 ulcerative colitis, and four indeterminate colitis). Mean duration of the initial course of treatment was 634 days. The overall remission rates were 45% for Crohn's disease and 58% for ulcerative colitis.

Common Side Effects of Imuran (Azathioprine) Drug Center

Imuran Side Effects Center

Medical Editor: [John P. Cunha, DO, FACOEP](#)

Last reviewed on RxList 9/16/2016

Imuran (azathioprine) is an **immunosuppressive antimetabolite** used to prevent the body from rejecting a transplanted kidney. Imuran is also used to treat symptoms of **rheumatoid arthritis**. Imuran is available in **generic** form. Common side effects of Imuran include:

- upset stomach,
- nausea,
- vomiting,
- diarrhea,
- loss of appetite,
- hair loss, or
- skin rash.

2015 Analysis of Imuran

An increased risk of side effects was seen in participants who received azathioprine. Some of these side effects such as leukopenia (a reduction in the number of white cells in the blood) were serious in nature. Common side effects included pancreatitis (inflammation of the pancreas), leukopenia, nausea, allergic reaction and infection. The choice to use azathioprine or 6-mercaptopurine should be made after careful consideration of the risks and benefits of using these drugs. More research is needed to allow conclusions about the comparative effectiveness and side effects of azathioprine and 6-mercaptopurine compared to other maintenance therapies such as methotrexate. Further research is needed to assess the effectiveness and side effects of the use of azathioprine with infliximab and other biologics and to determine the optimal management strategy for patients with inactive Crohn's disease.

DNA TYPING OF ANCIENT PARASITE EGGS FROM ENVIRONMENTAL SAMPLES IDENTIFIES HUMAN AND ANIMAL WORM INFECTIONS IN VIKING-AGE SETTLEMENT

Martin Jensen Søe^{*†}, Peter Nejsum[‡], Brian Lund Fredensborg^{*}, and Christian Molin Outzen Kapel^{*}

^{*} Department of Plant and Environmental Sciences, University of Copenhagen, Thorvaldsensvej 40, 2-70, 3rd Floor, DK-1871 Frederiksberg C, Denmark.
Correspondence should be sent to: msoe@plen.ku.dk

ABSTRACT: Ancient parasite eggs were recovered from environmental samples collected at a Viking-age settlement in Viborg, Denmark, dated 1018–1030 A.D. Morphological examination identified *Ascaris* sp., *Trichuris* sp., and *Fasciola* sp. eggs, but size and shape did not allow species identification. By carefully selecting genetic markers, PCR amplification and sequencing of ancient DNA (aDNA) isolates resulted in identification of: the human whipworm, *Trichuris trichiura*, using SSUrRNA sequence homology; *Ascaris* sp. with 100% homology to *coxl* haplotype 07; and *Fasciola hepatica* using ITS1 sequence homology. The identification of *T. trichiura* eggs indicates that human fecal material is present and, hence, that the *Ascaris* sp. haplotype 07 was most likely a human variant in Viking-age Denmark. The location of the *F. hepatica* finding suggests that sheep or cattle are the most likely hosts. Further, we sequenced the *Ascaris* sp. 18S rRNA gene in recent isolates from humans and pigs of global distribution and show that this is not a suited marker for species-specific identification. Finally, we discuss ancient parasitism in Denmark and the implementation of aDNA analysis methods in paleoparasitological studies. We argue that when employing species-specific identification, soil samples offer excellent opportunities for studies of human parasite infections and of human and animal interactions of the past.

Why were the Vikings so much taller than Europeans of the same era?

They were taller *on average* than most Europeans of their time. Sometimes by much, sometimes not so. For example, average height of the Viking era (9th to 11th century) male skeletons found in Denmark, Norway and Iceland is 172cm. Those found in Sweden were taller, 176cm. However those of Anglo-Saxon England were also quite tall, 168cm. It seems their neighbours from France or Germany were shorter on average, though the difference wasn't critical. There are a few important factors which influence human height.

Genes Associated with Autoimmune Disease

IRF5 and STAT4, which are gene activators known to be involved in the stimulation of the immune response.

CXCR5, a cell-surface protein found in antibody-producing B cells. It is known to help guide B-cells to the lymph nodes, where many of the body's B cells reside.

TNIP1, a binding partner for TNFAIP3, a protein that plays a role in limiting inflammation.

IL12A, which is a part of a protein that helps activate immune cells like T cells and natural killer cells.

BLK, which is a type of enzyme called a tyrosine kinase. BLK is involved in activating B cells.

Vikings Taller



Increased Eosinophils decreases Cancer

Inverse association of eosinophil count with colorectal cancer incidence: Atherosclerosis Risk in Communities Study

Anna E Prizment,¹ Kristin E Anderson,^{1,2} Kala Visvanathan,³ and Aaron R Folsom^{1,2}

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The publisher's final edited version of this article is available free at [Cancer Epidemiol Biomarkers Prev](#)
See other articles in PMC that [cite](#) the published article.

Go to:

Abstract

Background

Allergic conditions are associated with reduced risk of several malignancies. We hypothesized that blood eosinophil count, a marker for allergic disorders, is inversely associated with the risk of colorectal cancer (CRC) in the Atherosclerosis Risk in Communities (ARIC) prospective cohort. To our knowledge, the association between blood eosinophil count and cancer risk has not been investigated before.

Methods

Relative eosinophil and total leukocyte counts were measured in blood at baseline. Absolute eosinophil counts were calculated by multiplying relative count by the total leukocyte count. Proportional hazards regression provided hazard ratios (HR) and 95% confidence intervals (CI) of CRC in relation to eosinophil count.

Results

From 1987–2006, 242 incident CRC cases (187 colon; 56 rectal) occurred in 10,675 initially cancer-free participants. In a multivariate-adjusted model, HRs were 1.0, 0.70 (95%CI, 0.50;0.98) and 0.58 (95%CI, 0.40;0.83) across tertiles of absolute eosinophil count (P -trend=0.003). A similar inverse association was observed for relative eosinophil count. Age, sex, race, or smoking status did not modify associations.

Conclusions and impact

We observed an inverse association between blood eosinophil count and CRC risk. This novel finding supports the hypothesis that allergies are protective for colorectal cancer, since an increased eosinophil count correlates with allergy in the developed world.

Diethylcarbamazine

From Wikipedia, the free encyclopedia

Diethylcarbamazine (DEC) is a medication used in the treatment of [filariasis](#) including [lymphatic filariasis](#), [tropical pulmonary eosinophilia](#), and [loiasis](#). It may also be used for prevention of [loiasis](#) in those at high risk.^[1] While it has been used for [onchocerciasis](#) (river blindness), [ivermectin](#) is preferred.^[2] It is taken by mouth.^[3]

Common side effects include [itching](#), [facial swelling](#), [headaches](#), and [feeling tired](#). Other side effects include [vision loss](#) and [dizziness](#).^[4] It is a recommended treatment in [pregnancy](#) and appears to be safe for the baby.^{[5][6]} The World Health Organization; however, recommends until after pregnancy for treatment.^[2] It is made from [piperazine](#).^[7]

Diethylcarbamazine was discovered in 1947.^[8] It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system.^[9] The wholesale cost in the developing world is less than 0.01 USD per dose.^[3] It is not commercially available in the United States but can be gotten from the Center for Disease Control.^[1]

However, they then embarked on a second study with an important modification [4]. This time, after hookworm infection was established, CeD patients were ‘tolerized’ with gluten microchallenges (escalating from 10 mg), before being challenged with 3 g daily for 2 weeks [4]

The most interesting observation made by Giacomin *et al.* is that microbial richness was significantly increased in the trial participants during the course of the study [5].

We had also previously observed that the dysbiosis of juvenile rhesus macaques suffering from chronic idiopathic colitis could be reversed by experimental whipworm (*Trichuris trichiura*) infection [8]. In sum, the evidence that helminths could potentially shift bacterial communities to increase species richness is increasing.

Ivermectin

From Wikipedia, the free encyclopedia

Ivermectin is a medication that is effective against many types of [parasites](#).^[1] It is used to treat [head lice](#),^[2] [scabies](#),^[3] [river blindness](#),^[4] [strongyloidiasis](#),^[5] and [lymphatic filariasis](#), among others.^[6] It can be either applied to the skin or taken by mouth. The eyes should be avoided.^[2]

Common side effects include red eyes, dry skin, and burning skin.^[2] It is unclear if it is safe for use during [pregnancy](#), but is likely acceptable for use during [breastfeeding](#).^[7] It is in the [avermectin](#) family of medications and works by causing an increase in permeability of cell membrane resulting in paralysis and death of the parasite.^[2]

Ivermectin was discovered in 1975 and came into medical use in 1981.^{[6][8]} It is on the [World Health Organization's List of Essential Medicines](#), the most effective and safe medicines needed in a [health system](#).^[9] The wholesale cost in the [developing world](#) is about US\$0.12 for a course of treatment.^[10] In the [United States](#) it costs \$25–50.^[5] In other animals it is used to prevent and treat [heartworm](#) among other diseases.^[1]

Five Agents Treat Most Infections

Many of the anthelmintics available for human use are effective against several helminth species, and although there are over 20 different species of helminths that cause disease of global significance in humans (see table 1), almost all of these infections can be treated or controlled with one of 5 anthelmintics: the benzimidazoles albendazole and mebendazole, diethylcarbamazine, ivermectin, and praziquantel.

Praziquantel

Praziquantel, sold under the brandname **Biltricide** among others, is a medication used to treat a number of types of [parasitic worm infections](#). Specifically it is used for [schistosomiasis](#), [clonorchiasis](#), [opisthorchiasis](#), [tapeworm infections](#), [cysticercosis](#), [hydatid disease](#), and other [fluke infections](#).^[2] It should not be used for cysticercosis that involves the eye.^[3] It is taken by mouth.^[2] Side effects may include poor coordination, abdominal pain, vomiting, headache, and allergic reactions. While it may be used during [pregnancy](#), it is not recommended for use during [breastfeeding](#).^[3] Praziquantel is in the [anthelmintic](#) class of medications. It works partly by affecting the function of the worm's sucker.^[2]

Drug Resistance to Be Avoided

As yet there is no confirmed report of anthelmintic drug resistance in a soil-transmitted nematode infection in humans. However, resistance to benzimidazoles, levamisole, and, to a lesser extent, avermectins, are commonly reported in the veterinary literature. Thus, there is understandable concern that this problem may threaten the use of anthelmintic drugs for the control of soil-transmitted nematodes in humans.

Chemotherapy should be used in such a way that the emergence of drug resistance is delayed or circumvented, while health benefits continue to accrue. Factors that can act against the development of drug resistance include.

treatment of only a proportion of the population in an infected community (e.g. targeting school children), which will ensure that some nematodes remain in the community and that the genes of these survivors will dilute those of the nematodes experiencing selection pressure
giving treatment at intervals greater than those of the nematode's generation time

changing the drug of choice for a particular control program.

At the same time, development of a protocol for the detection of suspected drug resistance, e.g. fecal egg count reduction tests, would be prudent.

Table 2. Differential Features: Comparison of the 5 most widely used anthelmintics in the treatment of parasitic worm infections

| Drug | Mebendazole | Albendazole | Diethylcarbamazine | Ivermectin | Praziquantel |
|---|--|--|--|------------------------------------|--|
| Class | Benzimidazole | Benzimidazole | Piperazine derivative | Macrocytic lactone (avermectin) | Pyrazinoquinoline |
| Indications (see table 1 for more detailed spectrum) | Drug of choice for threadworm; also roundworm, whipworm, hookworm infections | Adjunct to surgery in hydatid cysts caused by <i>Echinococcus granulosus</i> or <i>E. multilocularis</i> , or primary treatment if surgery not available; strongyloidiasis | Microfilariae and adult worms of <i>Loa loa</i> , <i>Wuchereria bancrofti</i> , <i>Brugia malayi</i> | Drug of choice for onchocerciasis | Drug of choice for schistosomes. Highly effective in most tapeworms and flukeworm infections |

Natural Products as a Source for Treating Neglected Parasitic Diseases

Dieudonné Ndjonka,^{1,†} Ludmila Nakamura Rapado,^{2,†} Ariel M. Silber,² Eva Liebau,^{3,*} and Carsten Wrenger^{2,*}

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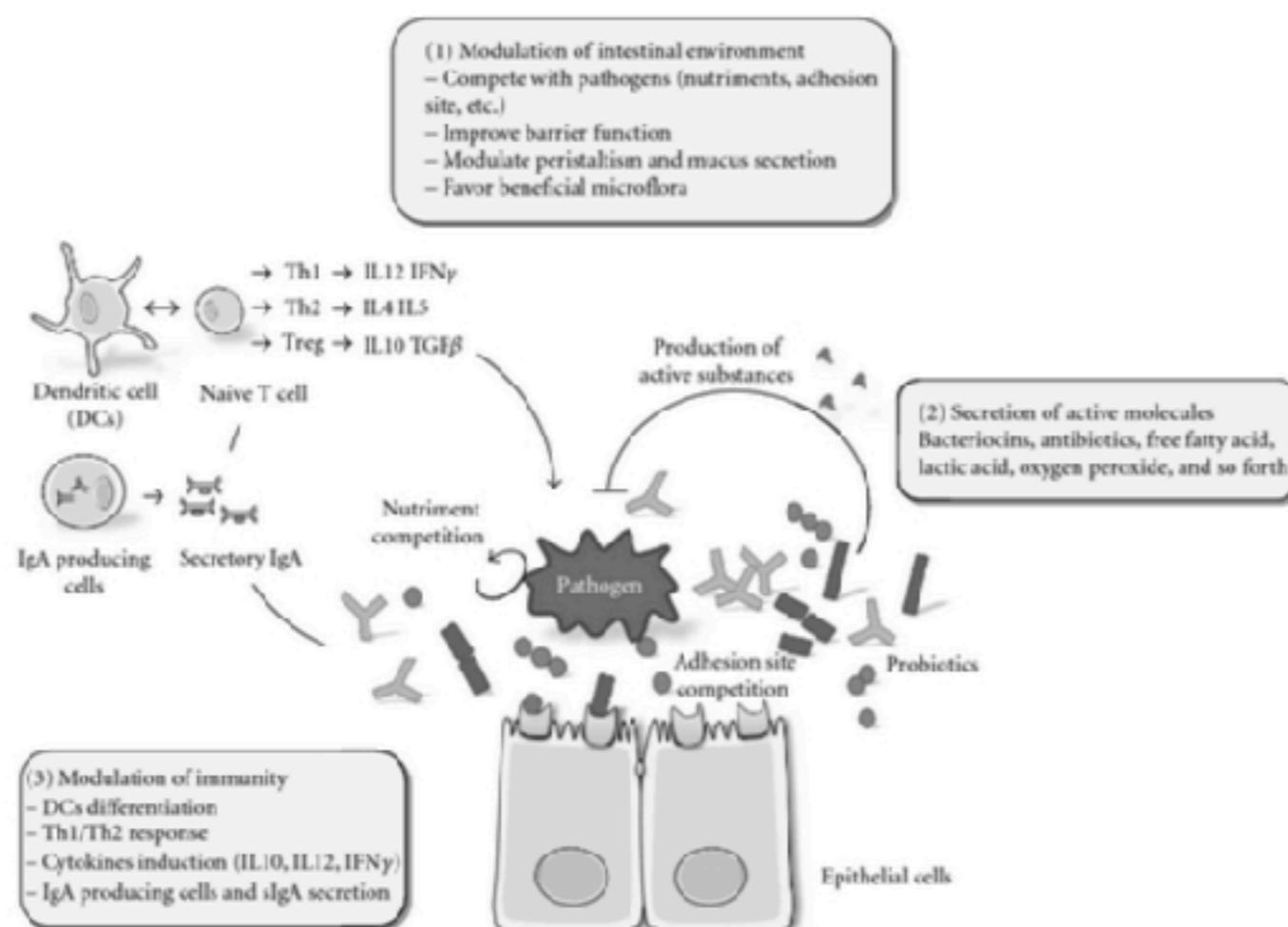
This article has been [cited by other articles in PMC](#).

Abstract

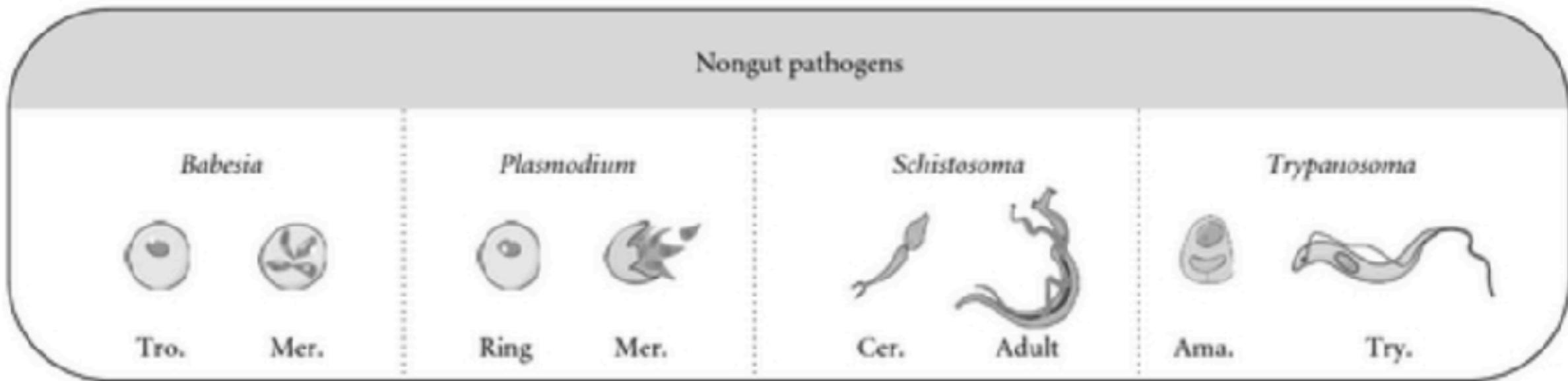
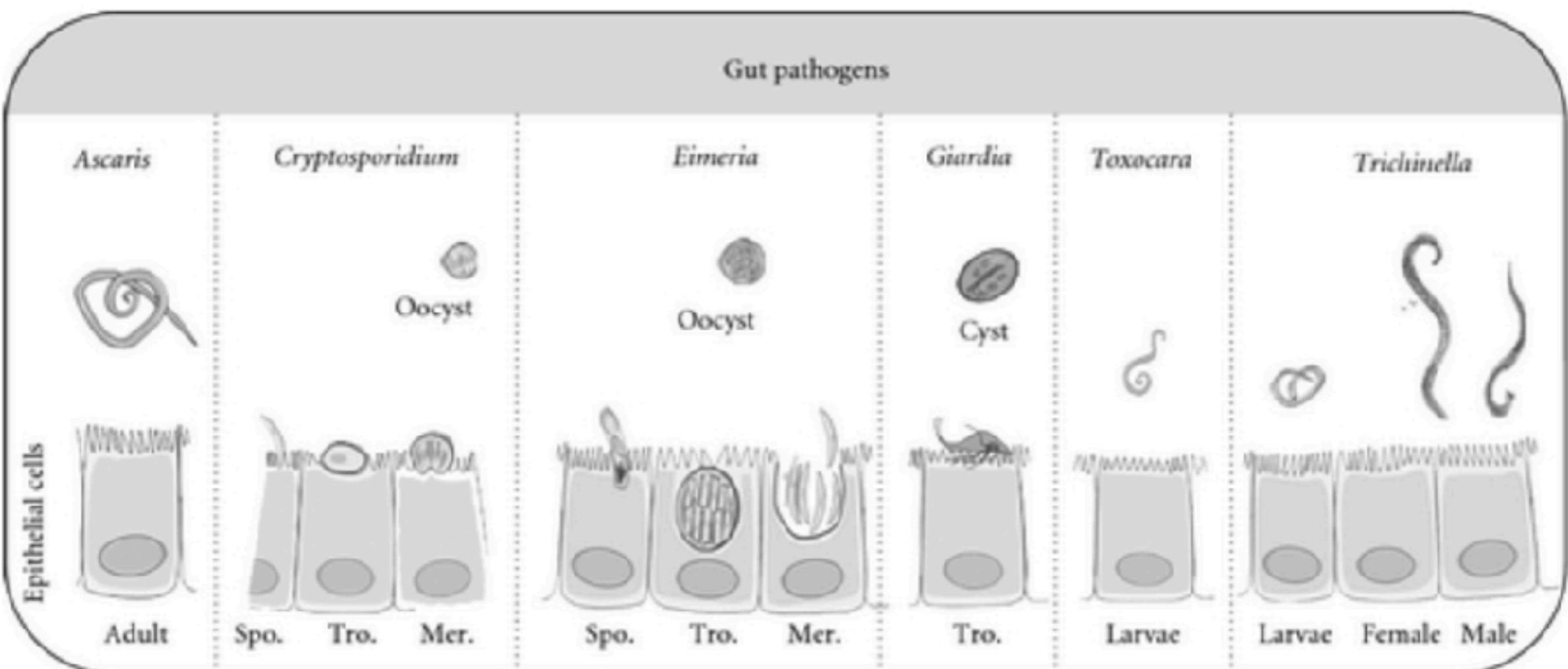
Go to: 

Infectious diseases caused by parasites are a major threat for the entire mankind, especially in the tropics. More than 1 billion people world-wide are directly exposed to tropical parasites such as the causative agents of trypanosomiasis, leishmaniasis, schistosomiasis, lymphatic filariasis and onchocerciasis, which represent a major health problem, particularly in impecunious areas. Unlike most antibiotics, there is no “general” antiparasitic drug available. Here, the selection of antiparasitic drugs varies between different organisms. Some of the currently available drugs are chemically *de novo* synthesized, however, the majority of drugs are derived from natural sources such as plants which have subsequently been chemically modified to warrant higher potency against these human pathogens. In this review article we will provide an overview of the current status of plant derived pharmaceuticals and their chemical modifications to target parasite-specific peculiarities in order to interfere with their proliferation in the human host.

Keywords: neglected infectious diseases, natural compounds, schistosomiasis, river blindness, trypanosomatids

Figure 1

Schematic representation of the different routes by which probiotics may control a pathogen. (1) Probiotics can modulate their physicochemical environment (nutrients, mucus, receptors availability on epithelial cells, pH, tight junctions, and peristalsism). (2) Probiotics can produce biologically active molecules such as bacteriocins, antibiotics, or oxygen peroxide that possess antimicrobial properties. (3) Probiotics can induce immune modulation, either through interaction with dendritic cells that can, in turn, modulate the differentiation of naïve T cells into Th1, Th2, or Treg lymphocytes, leading to different cytokine induction and/or through a humoral immune response *via* IgA producing cells and their secretory IgA (sIgA).



Parasites Prevention And Treatment treatment

Anti-helminthic (anti-parasitic): Anti-helminthic drugs are used to kill parasites that have entered the body. They may be taken by mouth, applied to the skin, or injected into the vein. Treatment varies, depending on the type and severity of the infection.

The most commonly prescribed medication to treat ascariasis includes mebendazole (Vermox®), albendazole (Albenza®), and pyrantel (Antiminth® or Pin-Rid®).

Hookworm is generally treated with the drug mebendazole (Vermox®). According to researchers, mebendazole cures more than 99% of hookworm infections if it is taken twice a day for three days. It kills both the worms and the eggs.

Albendazole (Albenza®) or pyrantel (Antiminth®) may be taken as alternatives. These drugs are taken once per day for three days.

Medline Database Search:
(helminth OR Nippostrongylus OR Heligmosomoides
polygyrus OR schistosom* OR Trichinella OR
echinococcus OR nematode OR filaria* OR
Acanthocheilonema) AND (transplant OR
transplantation OR allograft OR skin graft)
n = 689

Additional results subsequently identified from
references

n = 12

Abstracts screened for relevance

n = 701

Full-text articles assessed for eligibility

n = 106

Articles included in Qualitative synthesis

n = 55

Diethylcarbamazine

From Wikipedia, the free encyclopedia

Diethylcarbamazine (DEC) is a medication used in the treatment of filariasis including lymphatic filariasis, tropical pulmonary eosinophilia, and loiasis. It may also be used for prevention of loiasis in those at high risk.^[1] While it has been used for onchocerciasis (river blindness), ivermectin is preferred.^[2] It is taken by mouth.^[3]

Common side effects include itching, facial swelling, headaches, and feeling tired. Other side effects include vision loss and dizziness.^[4] It is a recommended treatment in pregnancy and appears to be safe for the baby.^{[5][6]} The World Health Organization; however, recommends until after pregnancy for treatment.^[2] It is made from piperazine.^[7]

Diethylcarbamazine was discovered in 1947.^[8] It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system.^[9] The wholesale cost in the developing world is less than 0.01 USD per dose.^[3] It is not commercially available in the United States but can be gotten from the Center for Disease Control.^[1]

Medical use

Mebendazole is a highly effective, broad-spectrum [antihelmintic](#) indicated for the treatment of [nematode](#) infestations, including roundworm, hookworm, whipworm, threadworm, pinworm, and the intestinal form of [trichinosis](#) prior to its spread into the tissues beyond the digestive tract. Other drugs are used to treat worm infections outside the digestive tract, as mebendazole is poorly absorbed into the bloodstream.^[9] Mebendazole is used alone in those with mild to moderate infestations. It kills parasites relatively slowly, and in those with very heavy infestations, it can cause some parasites to migrate out of the digestive system, leading to appendicitis, bile duct problems, or intestinal perforation. To avoid this, heavily infested patients may be treated with piperazine, either before or instead of mebendazole. [Piperazine](#) paralyses the parasites, causing them to pass in the feces.^[10] It is also used rarely in the treatment of hydatid disease. Evidence for effectiveness for this disease, however, is poor.^[11]

Mebendazole and other benzimidazole antithelminetics are active against both larval and adult stages of nematodes, and in the cases of roundworm and whipworm, kill the eggs, as well. Paralysis and death of the parasites occurs slowly, and elimination in the feces may require several days.^[9]

Multiple Sclerosis Drug Doesn't Prevent Onset of Disability, Study Finds

The most widely prescribed drug for treating [multiple sclerosis](#) has little or no effect on a patient's progression to disability, a new study has found.

The medicine, interferon beta, does help reduce the development of brain lesions and limit the frequency of relapses, but until now there have been few well-controlled long-term studies demonstrating its effectiveness at preventing the onset of irreversible disability.

Researchers at the University of British Columbia prospectively collected data on 868 M.S. patients treated with interferon beta, comparing them with 1,788 patients who never took the drug. Using a well-validated scale, they found that those who took interferon beta were no less likely to suffer long-term disability than those who took none.

Worms in Organ Transplantation

There are indeed multiple potential opportunities for helminthic and helminth product therapy in transplantation. The most promising is with living-donor transplantation, whereupon a course of helminthic therapy may be commenced before the time of transplantation, allowing alloantigen presentation to occur in a tolerogenic environment (either at the time of the transplantation itself or with known defined alloantigens beforehand). Although treatment with active helminth infection has been shown to be a safe therapeutic approach ([25](#)), reports of mild gastrointestinal side effects do exist and might limit patient acceptability ([53](#)). Identification and synthetic production of the active compounds within helminthic secretions for novel pharmaceutical intervention is a definitive goal and the focus of much attention ([54](#)). Measured against current transplant immunosuppression regimens with multiple serious adverse effects and inadequate long-term organ protection against rejection, therapy with helminths or their products presents the exciting opportunity of a safe, effective, and long-overdue alternative.

Go to:

| | | | |
|------------------------------|------|--|------------|
| Monocytes | 8.3 | | 2.0 - 14.0 |
| Eosinophils | | | 0 - 6 |
| Basophils | 1.0 | | 0 - 2 |
| Immature Granulocytes | 0.4 | | <1 |
| Neutrophils, Absolute | 5410 | | 1650-8500 |
| Lymphocytes, Absolute | 2250 | | 1000-3850 |
| Monocytes, Absolute | 780 | | 30-850 |
| Eosinophils, Absolute | | | 0-600 |
| Basophils, Absolute | 90 | | 0-120 |

**Eosinophils
= worm sign**



800

800

800

Artemisia vulgaris

From Wikipedia, the free encyclopedia

This article is about the plant most often known as mugwort in Europe, for similar species and uses, see [Mugwort](#)

Artemisia vulgaris (mugwort^[2] or common wormwood) is one of several species in the genus *Artemisia* commonly known as mugwort, although *Artemisia vulgaris* is the species most often called mugwort. This species is also occasionally known as **riverside wormwood**,^[3] felon herb, **chrysanthemum weed**, **wild wormwood**, **old Uncle Henry**, **sailor's tobacco**, **naughty man**, **old man** or **St. John's plant** (not to be confused with **St John's wort**).^[4] Mugworts have been used medicinally and as culinary herbs.

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- 1 Distribution
- 2 Medicinal
- 3 Description
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- 5 External links



Mugwort

From Wikipedia, the free encyclopedia

For the common European species of mugwort, see [Artemisia vulgaris](#).

Mugwort is a common name for several species of aromatic plants in the genus *Artemisia*. In Europe, mugwort most often refers to the species *Artemisia vulgaris*, or common mugwort. While other species are sometimes referred to by more specific common names, they may be called simply "mugwort" in many contexts. For example, one species, *Artemisia argyi*, is often called "mugwort" in the context of [Traditional Chinese Medicine](#) but may be also referred to by the more specific name "Chinese mugwort". *Artemisia princeps* is Korean mugwort (Korean name: ssuk, 쑥).^[1] It is also found in Japan and Japanese mugwort is known as yomogi (ヨモギ).

Mugworts are used medicinally, especially in Chinese, Japanese, and Korean traditional medicine. Some mugworts have also found a use in modern medicine for their anti-herpetic effect. They are also used as an herb to flavor food. In Korea, mugworts were also used for plain, non-medicinal consumption; in South Korea, mugworts, called *ssuk*, are still used as a staple ingredient in many dishes including rice cakes and soup.



[Home](#) > [Home Remedies](#) > Hookworm

14 Effective Home Remedies For Hookworms



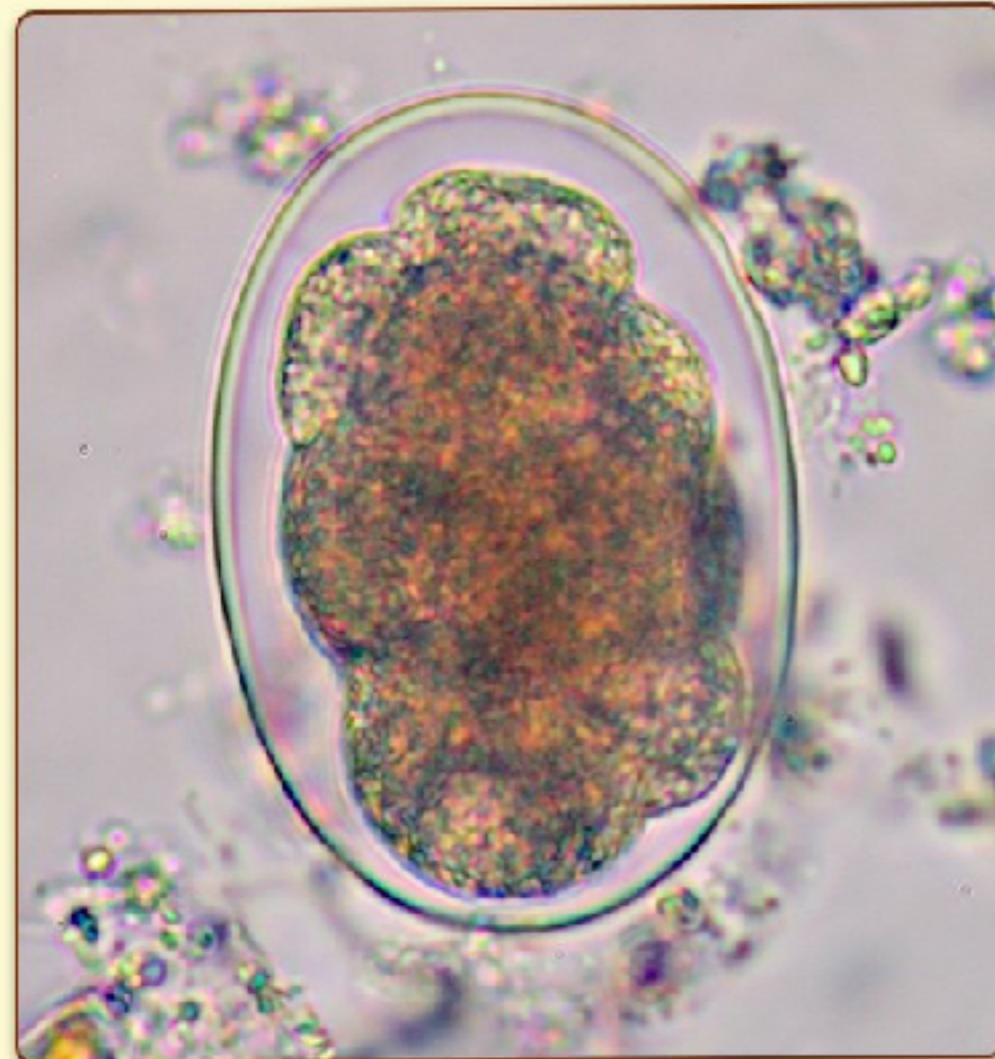
Some of the most useful [home remedies](#) for hookworms include the use of [garlic](#), diatomaceous earth, [thyme](#), wormwood, coconut, [papaya](#), carom seeds, [pumpkin seeds](#), [carrots](#), and [turmeric](#), as well as behavioral remedies that include wearing shoes and de-worming your pets.

Hookworms

One of the most widespread parasitic infections in the world, affecting nearly half a billion people annually, is hookworms. Also known as a hookworm infection, this affliction is caused by a bloodsucking roundworm, and the two species of worms that specifically infect human beings are *Ancylostoma duodenale* and *Necator americanus*. Hookworms [affect people](#) on every

continent, and the trouble with these infections is the lack of specific symptoms. [Anemia](#) ([iron](#) deficiency) and protein deficiencies occur after extended infection (due to the worms' bloodsucking nature), and more minor symptoms can include stomach distress, nausea, vomiting, and [diarrhea](#). In extremely serious infections, the lack of nutrients in the body can cause cardiac arrest, but hookworms are not typically considered lethal. They can contribute to higher levels of

6 BEST REMEDIES FOR HOOKWORMS



Garlic



Coconut



Cloves



Papaya



Turmeric



Wormwood

Homeopathic remedies for worms

Common Symptoms of Parasites in Humans



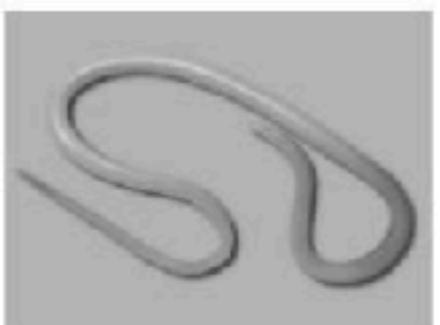
**Constipation.
Gas or bloating.
Diarrhea.**



**Pains or aches in the back, joints or muscles.
Irritable bowel syndrome.**



**Allergies.
Increased appetite.
Itchy ears, nose or anus.
Nervousness or grumpiness.
Chronic fatigue, lethargy or apathy.
Various skin problems.
Tooth grinding or clenching.**



**Anemia.
Excess weight.
Forgetfulness.
Vision problems.
Problems sleeping.**



Cina has a reputation as being the “go to” remedy for worms but other remedies

WORMS, Intestinal Worms in Humans – Signs & Symptoms, Adults, Children

Hpathy.com

Worms are intestinal parasites, which infest human beings as well as animals like cats, dogs etc. The common ones are **round worm, pin worm, tape worm, hook worm**etc.

Allergies, Many allergies in humans are caused by worm infections in humans. Tissue becomes inflamed and reactions to foods are the result when eosinophils (white blood cells) are increased due to them. Extreme skin rashes with blisters and food allergies or sensitivities may result.

Anemia, Worms in humans leach nutrients from bodies causing anemia. When they are present in large numbers, they can create enough blood loss to cause anemia or iron deficiency in some people.

Constipation, Some worms can obstruct certain organs like the colon, liver and the bile duct, causing constipation and other problems.

Diarrhea, Most of the time diarrhea is nature's way of removing toxins.

Fatigue, Symptoms include tiredness, flue-like symptoms, apathy, depression and a lack of concentration.

Gas and Stomach Bloating, Some parasites live in the upper intestine, which can cause both gas and stomach bloating.

Immune Dysfunction, Worms in Humans depress the immune system by decreasing immunoglobulin A.

Natural Remedies & Homeopathy Medicines for WORMS, Intestinal Worms in Humans

#Cina [Cina]

Produces a perfect picture of the wormy child. The patient is cross, irritable, has a sickly pale face with rings about the eyes, grates the teeth at night and has a tendency to convulsions; there is canine hunger or variable appetite; the child picks at its nose and cries out in its sleep; there is jerking of the hands and feet and a milky urine. It does not correspond well to pin-worms and a noticeable symptom is a bluish color about the mouth.

#Santonine. [Sant]

The alkaloid of Cina is also a remedy for round worms. It is not a safe remedy as Cina and no more efficacious. The writer has observed convulsions produced by its use in too low potencies.

#Caladium. [Calad]

Useful when worms travel over the perineum and get into the vagina in little girls, with tendency to excite masturbation.

#Teucrium. [Teucr]

The remedy for ascarides or pin-worms; there is much irritation caused by them in the rectum. Hughes prefers the tincture or lower dilutions, saying that it rarely fails in this condition. Another remedy for pin-worms is Sinapis nigra.

Cina and Cicuta are often indicated in convulsions from worms in humans.

#Spigelia. [Spig]

Strabismus, jerking with paleness of the face, blue rings around the eyes, faint, nauseated feeling with colic about the navel caused by the presence of worms, will indicate Spigelia. It has stools consisting of mucus, faces and worms. The tincture on a handkerchief and inhaled will frequently arrest convulsions from worms.

#Ignatia [Ign]

Is useful where the child is much excited and has tickling and creeping at the anus.

#Indigo [Indg]

Is a remedy for ascarides or thread-worms in melancholy children, with intense pain in the umbilical region, also convulsions from worms.

Helminths and Immunological Tolerance

Current immunosuppression regimens for solid-organ transplantation have shown disappointing efficacy in the prevention of chronic allograft rejection and carry unacceptable risks including toxicity, neoplasia, and life-threatening infection. Achievement of immunological tolerance (long-term antigen unresponsiveness in an immunocompetent host) presents the exciting prospect of freedom from immunosuppression for transplant recipients. It is now 60 years since the first demonstration of immunological tolerance in animal models of transplantation, but translation into routine clinical practice remains elusive. Helminth parasites may provide novel strategies toward achieving this goal. Helminths are remarkably successful parasites: they currently infect more than one quarter of the world's population. It is now well established that the parasites' success is the result of active immunomodulation of their hosts' immune response. Although this primarily secures ongoing survival of the parasites, helminth-induced immunomodulation can also have a number of benefits for the host.

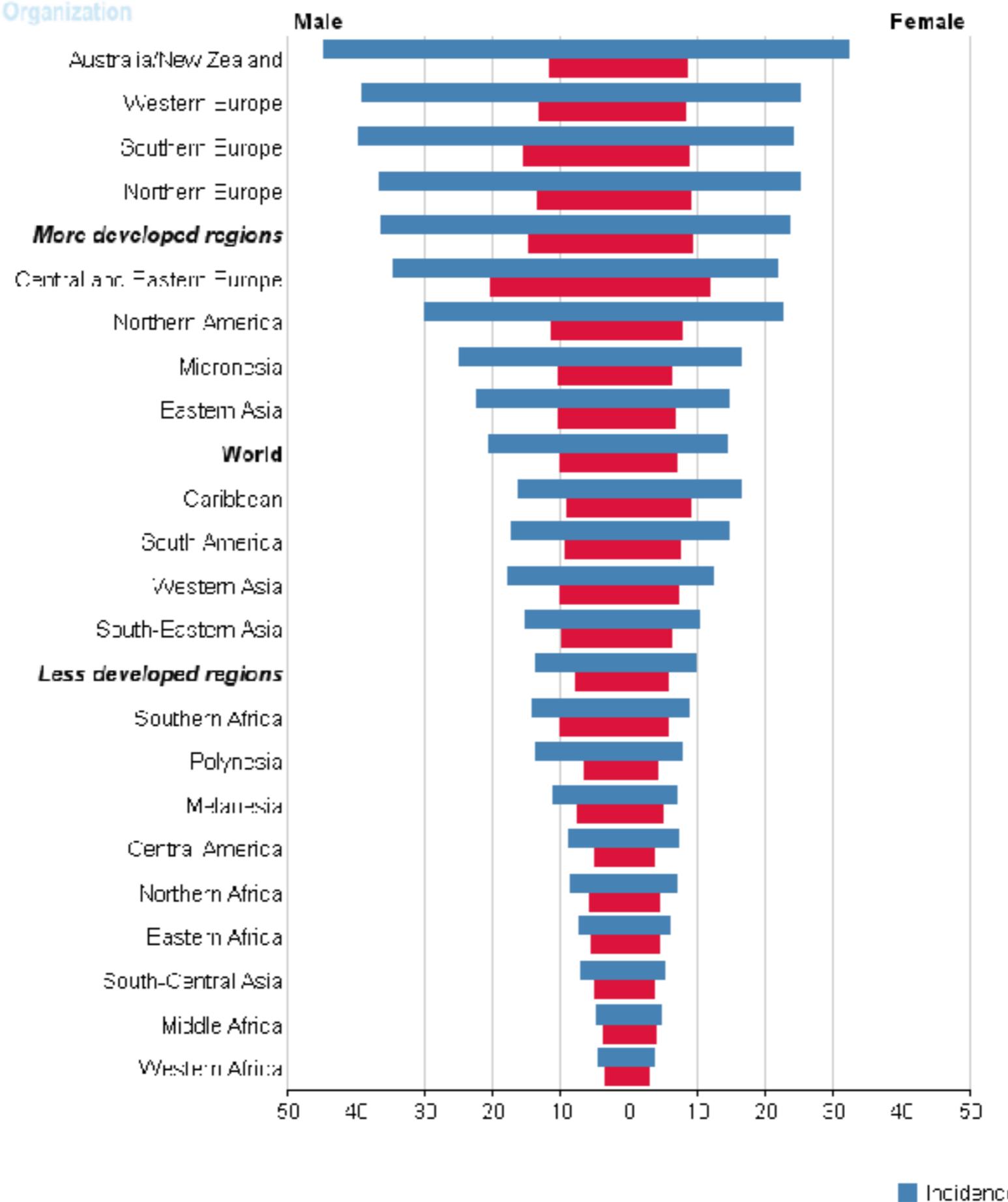
TABLE 1

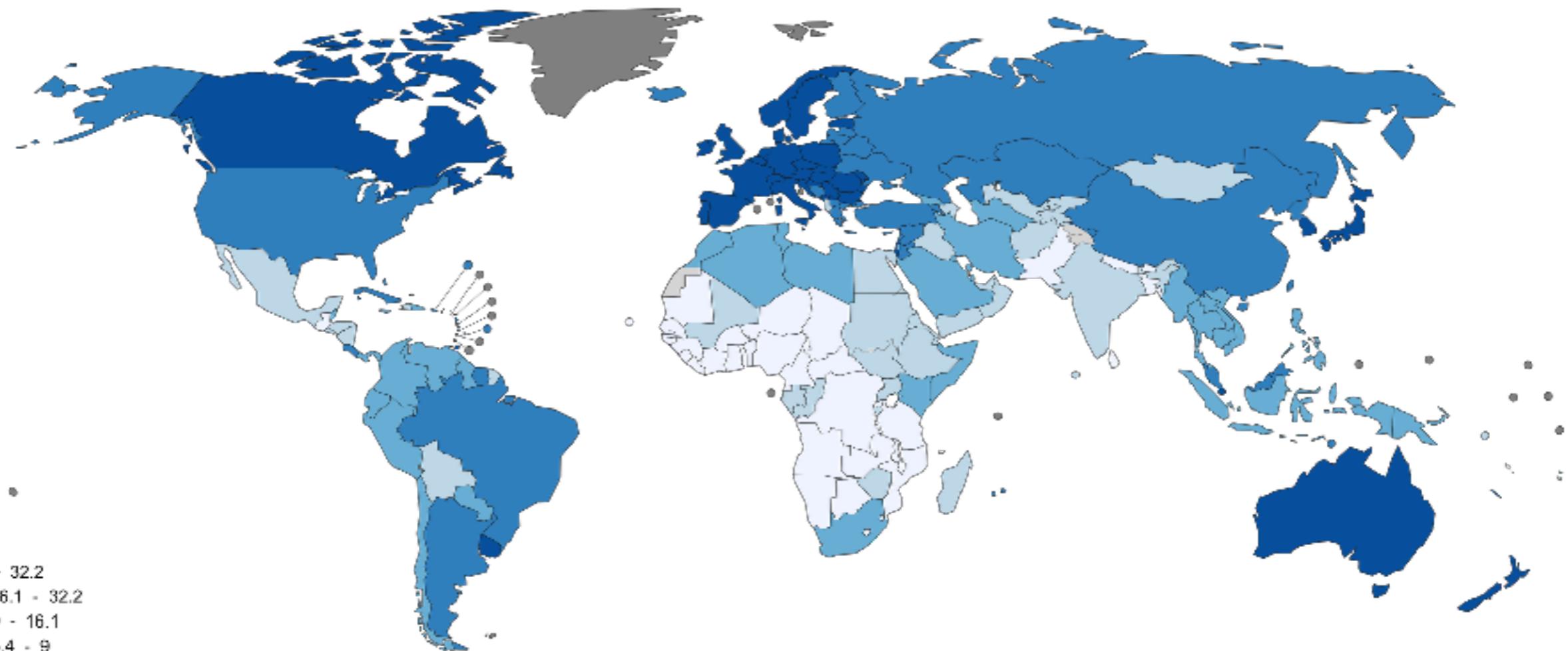
Published studies reporting prolonged allograft survival in humans or laboratory animals in helminth-infected hosts, or in animals given helminth-derived products.

| Authors | Parasite | Allograft model | Graft prolongation | P |
|----------------------------|---|--|-----------------------------|------------------|
| Aboul-Enein et al. (41) | <i>Schistosoma mansoni</i> | Human skin | 2.21 | 0.001 |
| Hepiretihan et al. (32) | <i>Echinococcus multilocularis</i> | Rat heart | 2.04 | <0.05 |
| Li et al. (31) | <i>E. multilocularis</i> | Rat liver | 1.57 | <0.05 |
| Liwski et al. (34) | <i>Nippostrongylus brasiliensis</i> | Mouse heart | 2.80 | <0.03 |
| Ledingham et al. (33) | <i>N. brasiliensis</i> | Rat kidney | 3.30 | <0.001 |
| Araujo et al. (42) | <i>Nippostrongylus</i> NES <i>S. mansoni</i> | Rat kidney Mouse skin | 2.22 1.5 | <0.001 <0.001 |
| Svet-Moldavsky et al. (43) | <i>Trichinella spiralis</i> | Mouse skin | 2.13 | — |
| Faubert and Tanner (44) | <i>T. spiralis</i> | Mouse skin | 1.89 | <0.001 |
| Chimyshkyan et al. (45) | Infected mouse serum | Mouse skin | 1.67 | — |
| | <i>T. spiralis</i> | Mouse skin | 2.48 | <0.001 |
| Alkarmi et al. (46) | <i>Trichinella pseudospiralis</i> <i>T. pseudospiralis</i> extract <i>T. spiralis</i> <i>T. spiralis</i> extract | Mouse skin Mouse skin Mouse skin Mouse skin | 3.57 2.0 3.57 2.43 | — — — — |

Ancient Egyptians

The record of human tapeworm eggs in coprolites is very scarce¹². Bruschi and colleagues found a cysticercosis case in an Egyptian mummy dated to the Ptolemaic period (200 to 100 years B.C.)¹³ and Bruschi speculates about the possible neurocysticercosis in Julius Caesar (100 to 44 B.C.) to explain his epilepsy episodes¹⁴.





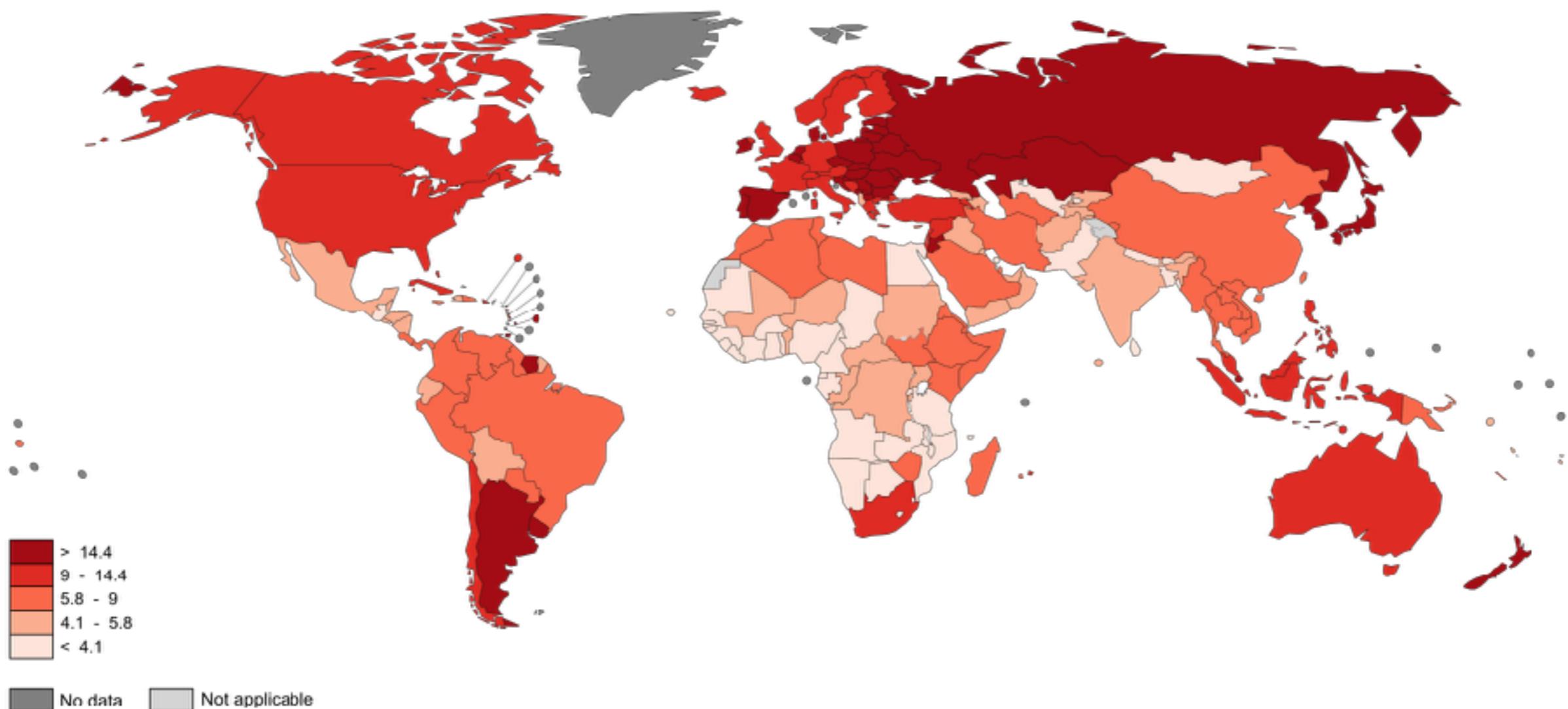
> 32.2
16.1 - 32.2
9 - 16.1
5.4 - 9
< 5.4

No data Not applicable

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data source: GLOBOCAN 2012
Map production: IARC
World Health Organization

 **World Health Organization**
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Data source: GLOBOCAN 2012
Map production: IARC
World Health Organization

 World Health Organization
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The techniques of molecular biology were able to evidence that *Ascaris lumbricoides* infection was commonly found in prehistoric groups, both in North America as in South America¹⁷,

Hookworms, *Trichuris trichiura* and *Ascaris lumbricoides*, found in archaeological sites both in North America and South America, dated as old as 9,000 years ago^{7 12 20}. The parasites were introduced by alternative routes, such as transpacific or coastal navigation⁷.

Ancient Rome Was Infested with Human Parasites, Poop Shows

By Laura Geggel, Senior Writer | • January 7, 2016 10:50pm ET

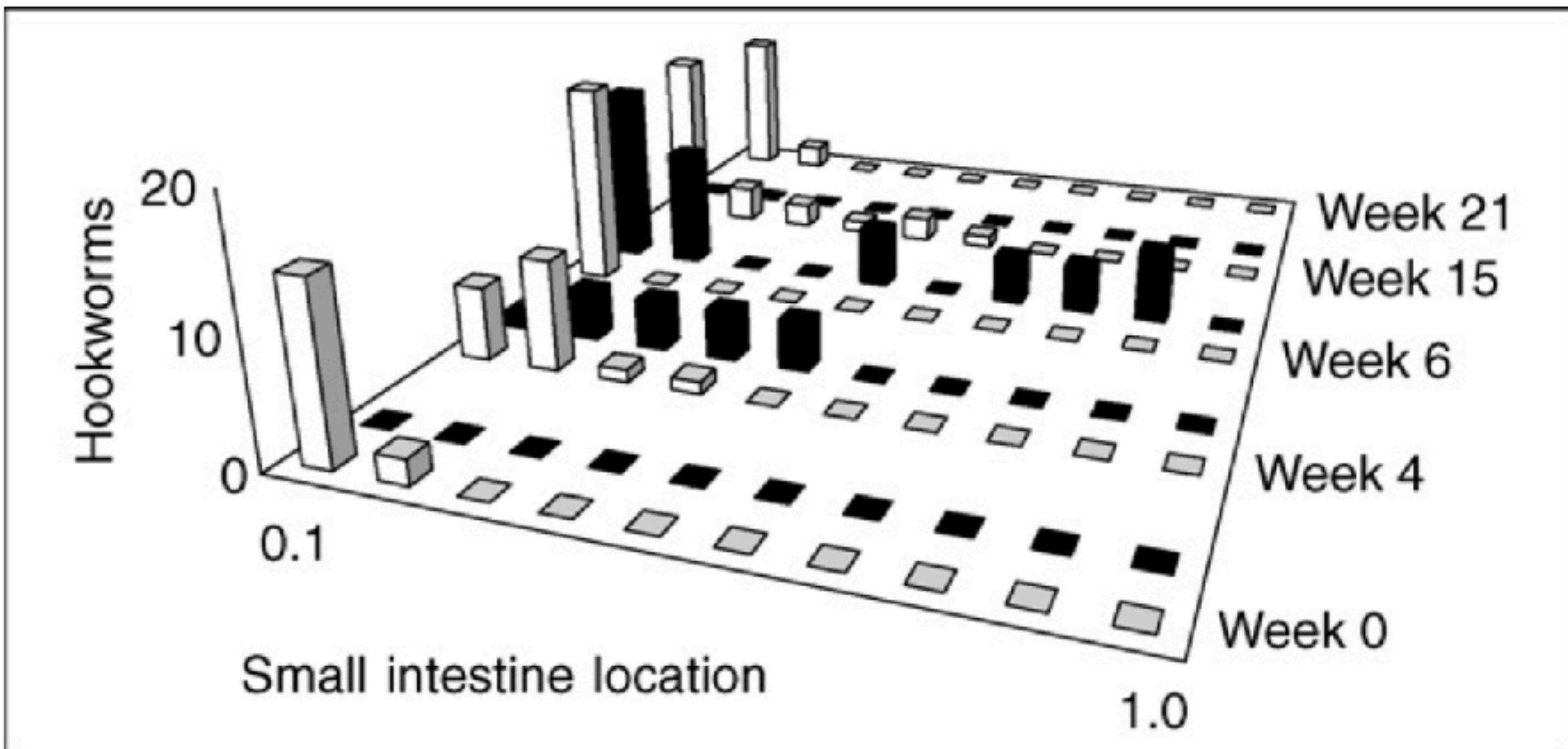
The Roman Empire is famous for its advanced sanitation — public baths and toilets — but human poop from the region shows that it was rife with parasites.

In fact, the empire was infested with a greater number of human parasites, such as whipworm, roundworm and *Entamoeba histolytica* dysentery, than during prior time periods.

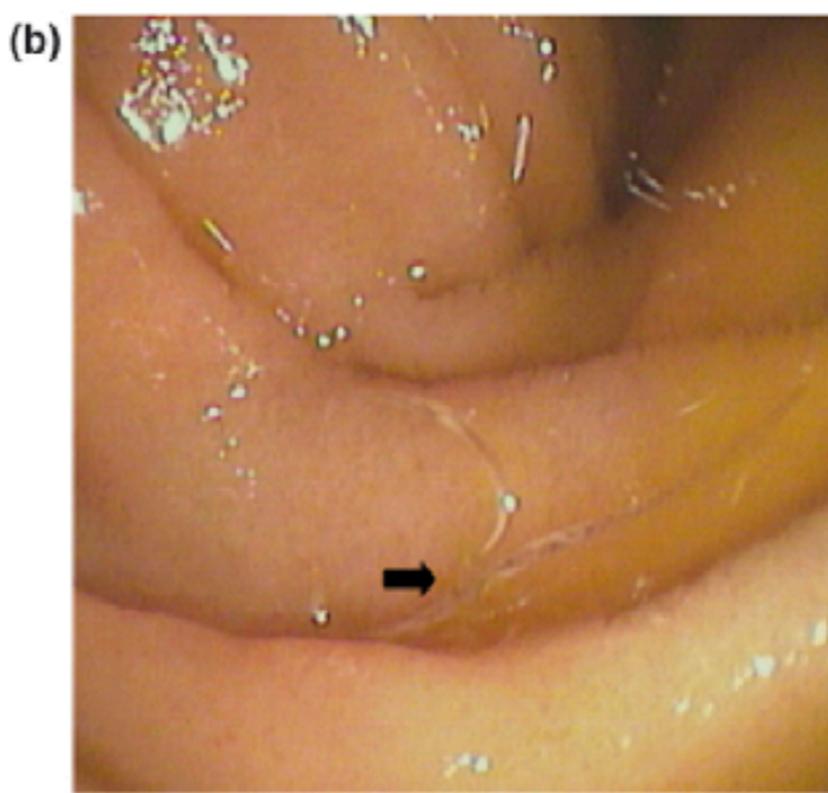
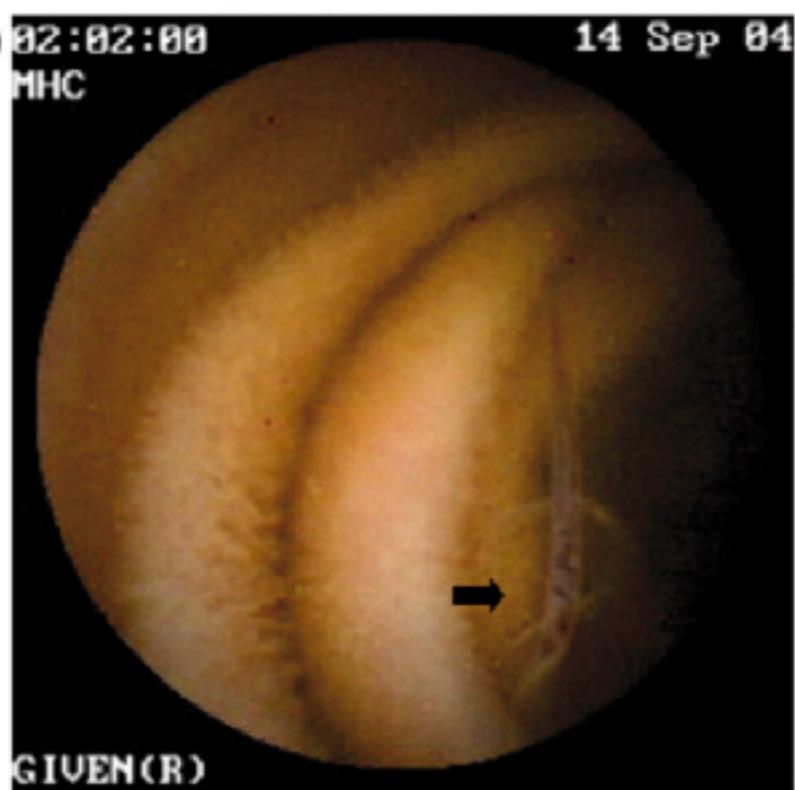
Chinese Parasites

Here, we bring together evidence from mummies, ancient latrines, and pelvic soil from burials, dating from the Neolithic Period to the Qing Dynasty, in order to better understand the health of the past inhabitants of China and the diseases endemic in the region. Seven species of intestinal parasite have been identified, namely roundworm, whipworm, Chinese liver fluke, oriental schistosome, pinworm, *Taenia* sp. tapeworm, and the intestinal fluke *Fasciolopsis buski*. It was found that in the past, roundworm, whipworm, and Chinese liver fluke appear to have been much more common than the other species

Hookworms live in the small intestine, attach to the mucosa using their large mouths and suck blood. They release many active compounds to stop blood coagulating (so they can drink it much easier) and to reduce the immune response of the host. By suppressing the inflammatory and allergic reactions at their attachment site hookworms can survive for many years (Croese et al 2006, Croese and Speare 2006). Some experimental infections with *N. americanus* have lasted for 15 years.



IgE seems to enhance allergic damage when a colony exceeds the size that is constitutively appropriate for the host.

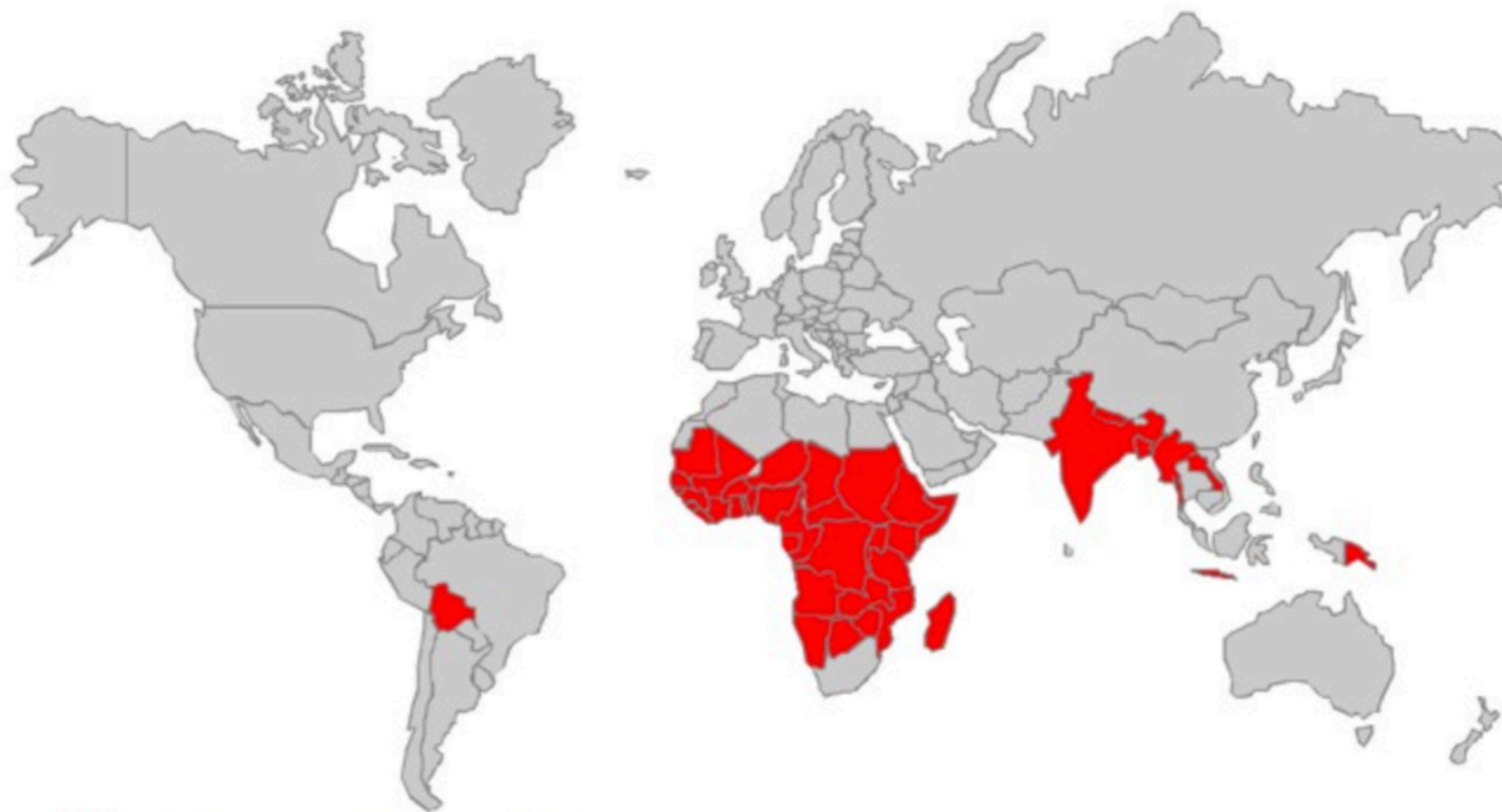


Capsule
Endoscopy

Showing
Hookworm
Attachment

A

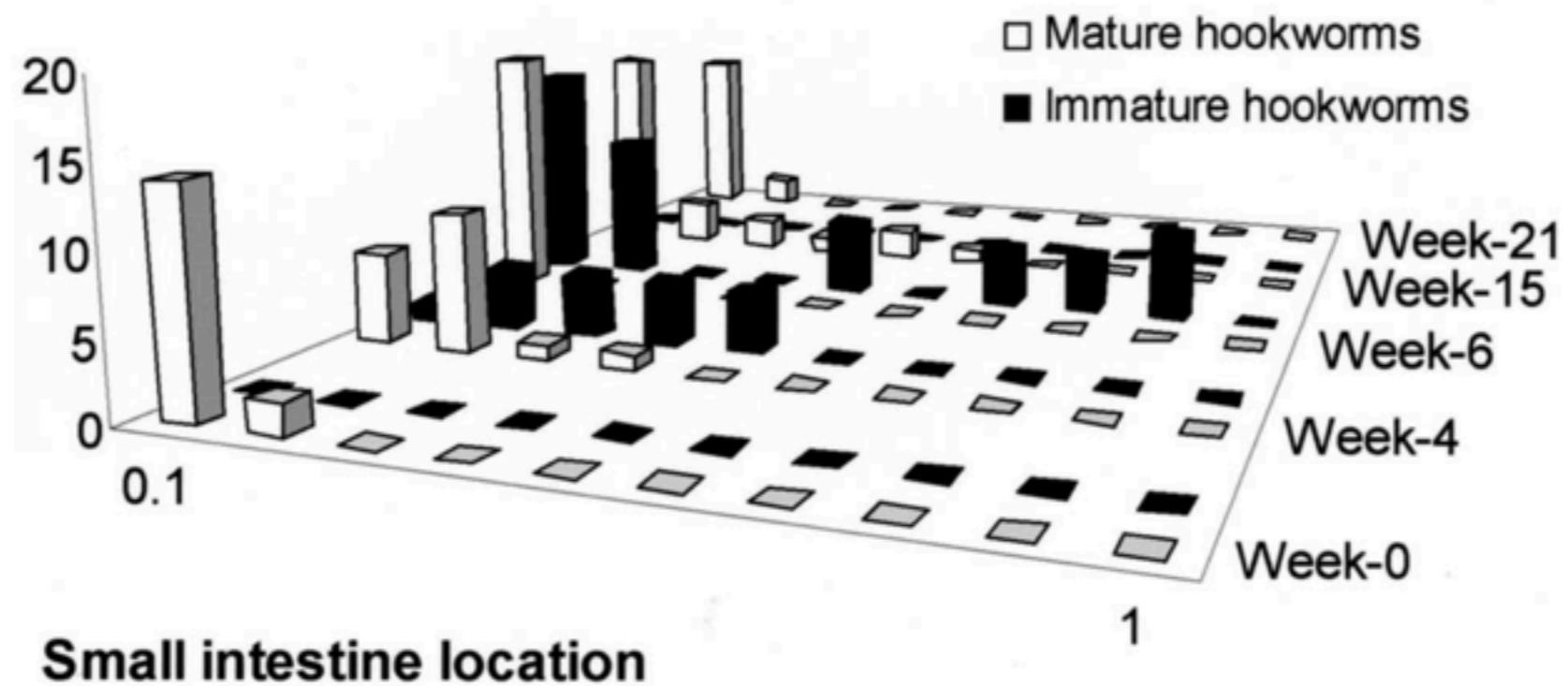


B

- Top Quartile Parasitic Disease DALY Burden
- Bottom 75% Parasitic Diseases DALY Burden

In both researchers, the colony appeared to contract to a constitutively determined status quo; in RD1, the week-0 count was 16, and, at week-21, it was 15; and, in RD2, the respective counts were 6 and 9.

Distal drift of immature hookworms-RD1



19. o Bleeding from the site continue for sometime due to the anticoagulant activity of the secretions of the wormo Blood loss over a period of time leads to microcytic hypochromic iron deficiency anaemiao Degree of anaemia is directly proportional to worm burdeno Worm loads upto 100 worms cause no symptoms, 500-1000 or more cause significant blood loss and anaemiao - count less than 5 eggs per mg of faeces cause no clinical disease,20 eggs or more significant anaemia, 50 or more massive infection

Hookworms live in the human intestine on average 3-10 years for *N. americanus* ([Hoagland and Schad, 1978](#)),

Different Hookworms

There are significant biological differences between the two major human hookworms ([Hoagland and Schad, 1978](#); [Hotez, 1995](#)), which are summarized in [Table 1](#). As noted above, *A. duodenale* is transmitted both by skin penetration of L3 as well as oral ingestion, whereas *N. americanus* usually infects only via the former route. *N. americanus* is smaller than *A. duodenale* and produces fewer eggs, and causes less blood loss ([Albonico et al., 1998](#)). Therefore, some investigators believe that *N. americanus* more adept at immune invasion, produces less blood loss, and therefore, better adapted to human parasitism ([Hoagland and Schad, 1978](#); [Pritchard and Brown, 2001](#)). Generally speaking, *A. duodenale* is associated with greater intestinal blood loss than any other hookworm. This accounts for the observation, best documented in Tanzania, that the species of hookworm being transmitted in a community strongly influences the burden of iron deficiency anaemia in the community ([Albonico et al., 1998](#)). However, *N. americanus* is more widespread worldwide and, therefore, more significant as a cause of disease burden.

| Characteristic | <i>N. americanus</i> | <i>A. duodenale</i> |
|--|----------------------|---------------------|
| Male adult size (mm) | 7-9 | 8-11 |
| Female adult size (mm) | 9-11 | 10-13 |
| Rate of egg production | 3000-6000 | 10,000-20,000 |
| Maturation delay in humans (days) | 40-50 | 28-50 |
| Life expectancy of infective larvae (days) | 3-5 | 1 |
| Life expectancy of adult worm (years) | 3-10 | 1-3 |
| Blood loss (ml). worm/day, mean (range) | 0.03 (0.01-0.04) | 0.15 (0.14-0.30) |
| Lactogenic transmission | No | Yes |
| Oral transmission | No | Yes |
| Arrested development | No | Yes |



Parasites - Hookworm

Hookworm

General Information



Epidemiology & Risk Factors

Biology

Disease

Diagnosis

Treatment

Prevention & Control

[CDC](#) > [Parasites Home](#) > [Hookworm](#) > [Disease](#)

Disease



High-intensity hookworm infections occur among both school-age children and adults, unlike the [soil-transmitted helminths *Ascaris*](#) and whipworm. High-intensity infections with these worms are less common among adults. The most serious effects of hookworm infection are the development of anemia and protein deficiency caused by blood loss at the site of the intestinal attachment of the adult worms. When children are continuously infected by many worms, the loss of iron and protein can retard growth and mental development.

Unlike *N. americanus*, *A. duodenale* also has the unique ability to undergo arrested development in humans ([Schad et al., 1973](#)) and may, under certain conditions, enter human mammary glands during pregnancy prior to lactogenic transmission ([Hotez, 1989](#); [Yu et al., 1995](#)). The occurrence of neonatal ancylostomiasis has been documented the best in Asia and Africa ([Yu et al., 1995](#)).

Many types of hookworms within NA

Recent studies of *N. americanus* indicate substantial genetic variation in parasite populations ([Hawdon et al., 2001](#); [Hu et al., 2003](#)), and a lack of correlation between geographical and genetic structure ([Hawdon et al., 2001](#))

Pregnancy and Hookworms

"I took one batch of 25 NA last year because I was experiencing pain and swelling every day from Graves and Hashimoto's diseases. I had a dramatic reduction in swelling and pain (and) lost about 15lbs of water weight. A few months later, I got pregnant, and did not have a miscarriage (I had 3 earlier that might have had something to do with the thyroid diseases). My TSH, T3 & T4 levels stabilized right before the pregnancy, they followed the "textbook" levels through the pregnancy and stabilized right after as well. My antibody levels for both diseases dropped. My Endo ... said - 'the improvements are real - and they are unexpected.'"

Hookworms Have a Conductor Like Effect

Hookworms appear to be more resistant to intestinal inflammation than are most other intestinal nematodes, perhaps reflecting their attachment and feeding strategies. Hamsters infected with *Trichinella spiralis*, *A. ceylanicum*, or *N. americanus* produced more intense mucosal response that cleared *T. spiralis*, while sparing the hookworms (Behnke et al., 1994). Indeed, depressed anti-*T. spiralis* antibody levels indicate that hookworms might protect other parasites by generally suppressing immune responses. This observation had been shown in field studies of humans of mono-infected and co-infected with *S. mansoni* and *N. americanus* in Brazil (Bottazzi, M.E., personal communication). Patients mono-infected with *S. mansoni* showed a much higher proliferative capacity than patients coinfected with *N. americanus* and *S. mansoni*. Furthermore, the level of IL-10 in co-infected patients was 10 times higher than *S. mansoni* mono-infected patients, an indication of the possible reasons for the general suppression of the immune system during *Necator* infection.

Human Hookworm Infection in the 21st Century (PDF Download Available). Available from: https://www.researchgate.net/publication/8125722_Human_Hookworm_Infection_in_the_21st_Century [accessed May 13, 2017].

Hookworms Improve Malaria

Finally, helminths have recently been implicated in individual differences in susceptibility to malaria. Results obtained recently in Thailand by Mathieu Nacher and colleagues provide evidence that helminths are associated with protection against malaria-associated renal failure and jaundice, and that helminth infected patients had reduced sequestration and higher nitric oxides concentrations than individuals uninfected with helminths (reviewed in Nacher, 2002). It is suggested that helminth-infected patients were protected from severe malaria because differences of IgE concentrations

Hookworms send out decoys

Interestingly, much of the IgE elicited during hookworm infection is not directed against the parasite; in fact, total levels of this isotype have been shown to correlate with a reduction in parasite weight and fecundity (Pritchard et al., 1995). This observation has led to the speculation that helminth parasites secrete pro-allergic mediators that induce polyvalent, non-parasite specific IgE, thus saturating IgE receptors on effector cells (Pritchard, 1993).

Human Hookworm Infection in the 21st Century

Children Infected at 6 months

Our knowledge of such transmission dynamics has been greatly aided by the development of mathematical models, which have been described and expanded in the work over the last 25 years of Roy Anderson and Robert May (Anderson and May, 1991). Coupled with decades of careful epidemiological investigation, this body of work has revealed that certain population characteristics can now be recognised as common to the epidemiology of hookworm and other helminth species: (1) age-intensity profiles are typically convex or reach a plateau in adulthood; (2) the distribution of worm burdens per host is extremely over-dispersed; (3) some individuals are predisposed to heavy (or light) infections; and (4) after chemotherapy reinfection rapidly occurs (see Section 7.2). For a more detailed description of the transmission dynamics of hookworm the reader is referred to reviews by Anderson (1982), Anderson and May (1991), and Bundy (1990). Here, the current focus is on summarizing epidemiological phenomenon and relating this to factors underlying observed patterns, as well as highlighting recent evidence.

4.1. Epidemiological patterns by age and sex

Studies have shown that children can be infected with hookworm as young as 6 months (e.g. Brooker et al., 1999). Subsequently, infection prevalence typically rises monotonically with increasing age to a plateau in adulthood (Figure 1.a). Interestingly, recent evidence from studies of populations in China and Southeast Asia suggest that peak prevalence is observed among the middle aged, or even individuals over the age of 60 years (Figure 1.b). Such age-profiles of hookworm contrast to the rapid increase in prevalence seen for *A. lumbricoides* and *T. trichiura* where maximum prevalence attained in 5-10 year age classes, and prevalence remains relatively stable during adulthood (Figure 1.a).

RN Sept 2016 Hook Labs

| | | ABNORMAL SUMMARY |
|-----------------------|------|------------------|
| Complete Blood Count | | |
| WBC | 10.9 | B |
| Eosinophils | 15.0 | B |
| Eosinophils, Absolute | 1640 | B |
| Thyroid Peroxidase Ab | 10.4 | B |

Roseanne April 2017

Thyroid Peroxidase Ab

3.9

< 9 IU/mL

Reported: 04/14/2017

Galactose-alpha-1,3-galactose IgE

PENDING

ABNORMAL SUMMARY

Complete Blood Count

Eosinophils

Eosinophils, Absolute

17.8

H

0 - 6 Percent

1700

H

0-600 10E3/uL

Comprehensive Metabolic Panel

AST (SGOT)

ALT (SGPT)

35

H

0 - 32 U/L

42

H

0 - 33 U/L

Hookworms have Protective Effect

Together, these findings strongly suggest that prenatal exposure to maternal helminth infection protects against infantile eczema and against the adverse effects of other exposures on this outcome. Whether this effect persists into later childhood, and influences risk of asthma, is currently under investigation.

Qualities of a good therapeutic worm.

The general ideal characteristics for a therapeutic helminth are as follows:^[6]

- Little or no pathogenic potential
- Does not multiply in the host
- Cannot be directly spread to close contacts
- Produces a self-limited colonization in humans
- Produces an asymptomatic colonization in humans
- Does not alter behaviour in patients with depressed immunity
- Is not affected by most commonly used medications
- Can be eradicated with an anti-helminthic drug
- Can be isolated free of other potential pathogens
- Can be isolated or produced in large numbers
- Can be made stable for transport and storage
- Easy to administer

Conclusions

The detrimental effects of treatment suggest that exposure to maternal worm infections *in utero* may **protect against eczema and wheeze in infancy.** The results for albendazole are also consistent with a direct drug effect. Further studies are required to investigate mechanisms of these effects, possible benefits of worms or worm products in primary prevention of allergy, and the possibility that routine deworming during pregnancy may promote allergic disease in the offspring.

Human's Have Worms

In Africa, the following parasites have been detected in ancient human feces: *S. stercoralis*, *S. haematobium*, *Taenia* spp., *Echinococcus granulosus*, *Trichinella spiralis*, *Dracunculus medinensis*, filarial worm, and possibly *A. lumbricoides* and *T. trichiura*. In Europe, ancylostomids, *A. lumbricoides*, *T. trichiura*, *E. vermicularis*, *Fasciola* spp., *F. hepatica*, *S. mansoni*, *S. haematobium*, *Dicrocoelium* spp., *D. dendriticum*, Opisthorchiformes, *Taenia* spp., *Diphyllobothrium* spp., *D. latum*, *G. duodenalis*, *E. granulosus*, *T. spiralis*, and possibly *S. stercoralis* have been found

Asian Worms

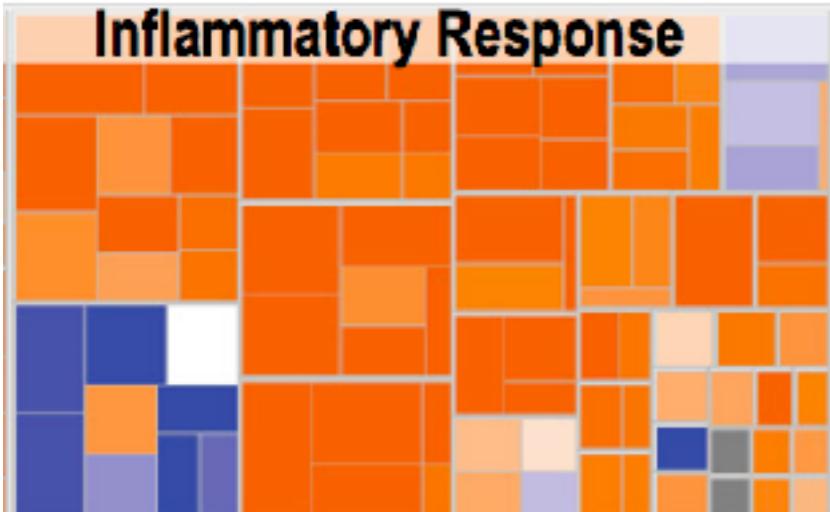
In Asia, *A. lumbricoides*, *T. trichiura*, *E. vermicularis*, *S. japonicum*, *C. sinensis*, *Taenia* spp., *T. solium*, *Diphyllobothrium* spp., *D. latum*, *E. histolytica*, *G. duodenalis*, *Chilomastix mesnili*, and *E. granulosus* have been found

North American Worms

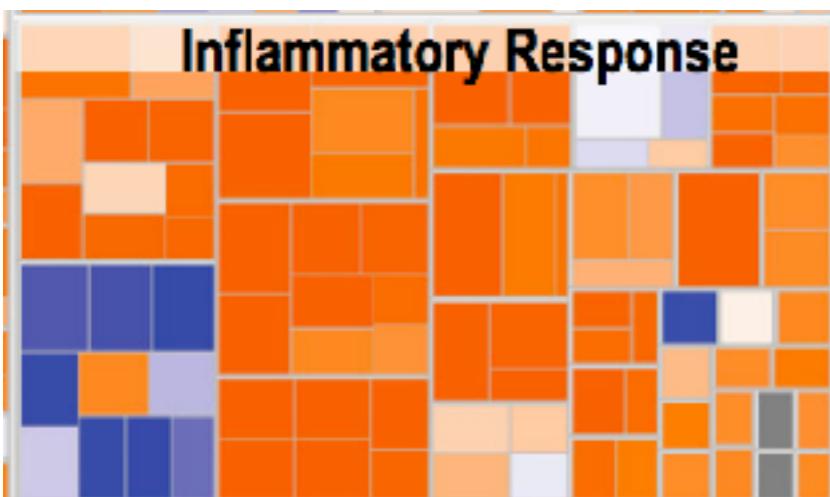
In North America, ancylostomids, *A. lumbricoides*, *T. trichiura*, *E. vermicularis*, *Trichostrongylus* spp., Opisthorchiformes, *Taenia* spp., *D. latum*, *D. pacificum*, *Hymenolepsis* spp., Acanthocephala, *G. duodenalis*, *E. granulosus*, *T. spiralis*, and possibly *S. stercoralis*, *Fasciola* spp. and *D. dendriticum* have been found.

Hookworms in Time

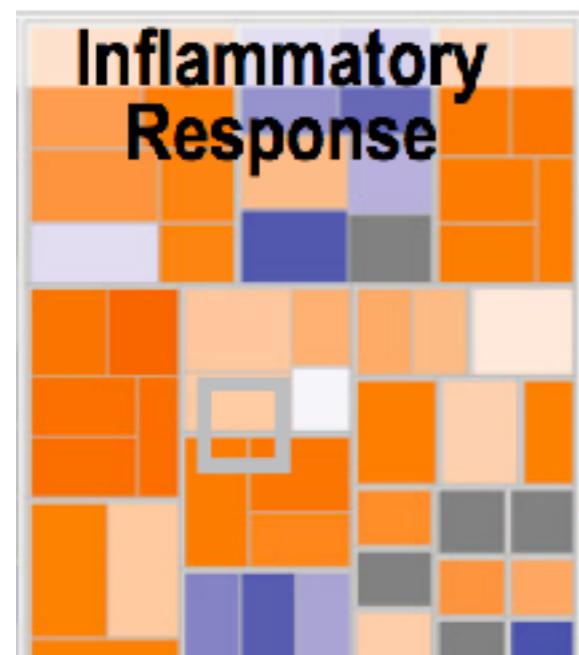
| Archaeological site/mummy | Country | Date |
|--|----------------|--------------------------|
| Pedra Furada, Piauí | Brazil | 7230 ± 80 BP |
| Tiliviche, Iquique | Chile | 4100 - 1950 BC |
| Clairvaux, Jura | France | 3600 BC |
| Boqueirão Soberbo, Minas Gerais | Brazil | 4905 ± 85 - 1325 ± 60 BP |
| Chalain, Jura | France | 2700 - 2440 BC |
| Daws Island, South Carolina ^a | USA | 1700 - 1300 BC |
| Hulin, Central Moravia | Czech Republic | 1600 - 1500 BC |
| Gentio Cave, Minas Gerais | Brazil | 3490 ± 120 - 430 ± 70 BP |
| Toconao Oriente, San Pedro de Atacama | Chile | 2500 - 2100 BP |
| Big Bone Cave, Tennessee | USA | 2177 ± 145 BP |
| Upper Salts Cave, Kentucky ^a | USA | 1125 - 290 BC |
| Valle Encantado, Neuquén | Argentina | 1000 - 500 BP |
| Tihuanaco | Peru | 890 - 950 AD |
| Buldir Island, Alaska ^b | USA | 1400 - 1700 AD |
| Namur | Belgium | 18th century AD |
| Newport, Rhode Island | USA | 18th century AD |
| Sitio do Meio, Piauí | Brazil | Not available |



Week 0



Week 3

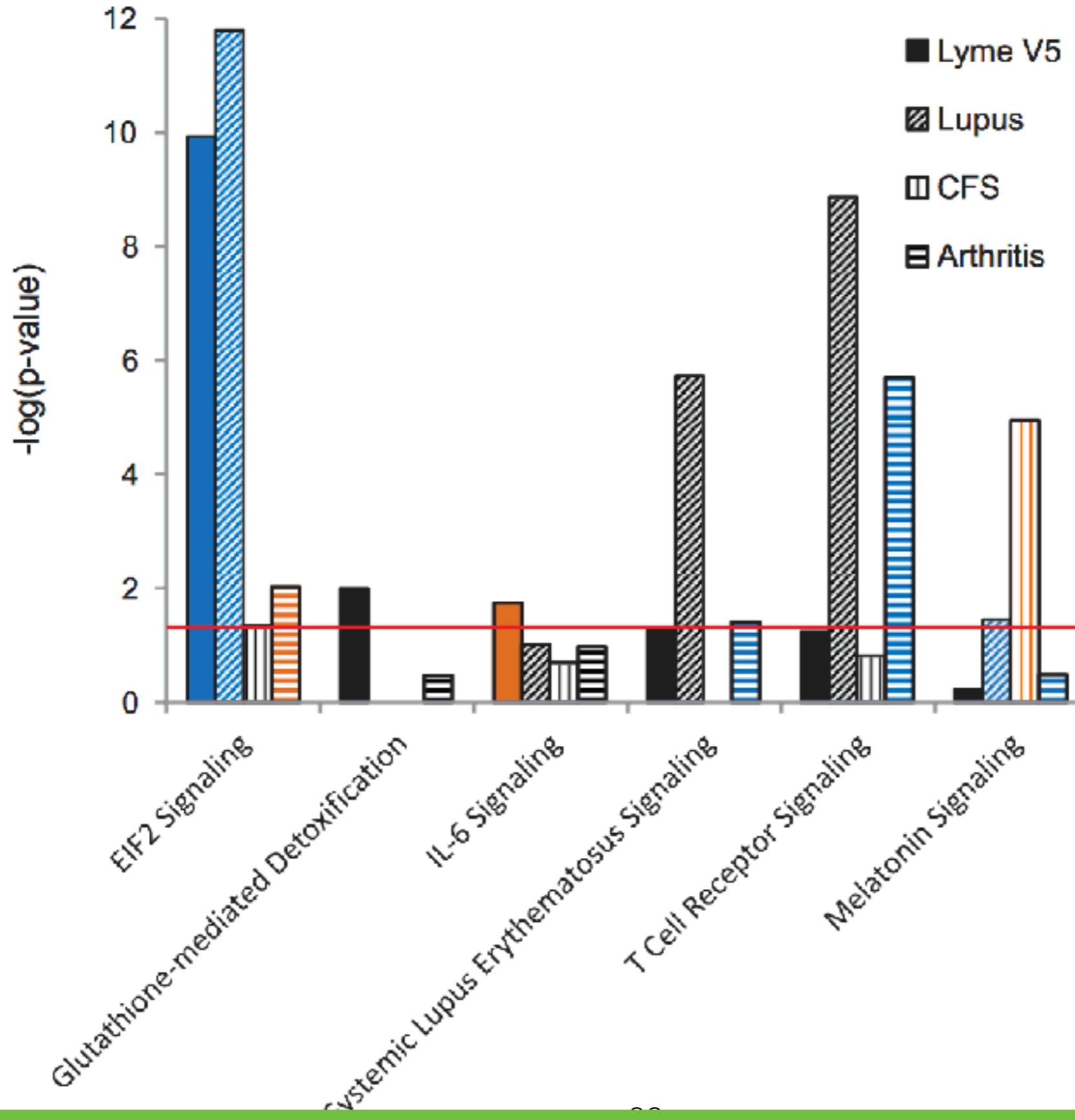


Month 6

Lyme

Inflammation
continues

Inflammation
Heat
Maps.

D

Inverse association of eosinophil count with colorectal cancer incidence: Atherosclerosis Risk in Communities Study

. Author manuscript; available in PMC 2012 Sep 1.

Published in final edited form as:

PMCID: PMC3175810

Conclusions and impact

We observed an inverse association between blood eosinophil count and CRC risk. This novel finding supports the hypothesis that allergies are protective for colorectal cancer, since an increased eosinophil count correlates with allergy in the developed world.

Fighting Fire with Fire?

Inverse association of eosinophil count with colorectal cancer incidence: Atherosclerosis Risk in Communities Study

. Author manuscript; available in PMC 2012 Sep 1.

Published in final edited form as:

PMCID: PMC3175810

Eosinophils orchestrate cancer rejection by normalizing tumor vessels and enhancing infiltration of CD8⁺ T cells

Rafael Carretero, Ibrahim M Sektioglu, Natalio Garbi, Oscar C Salgado, Philipp Beckhove & Günter J Hämmerling

[Affiliations](#) | [Contributions](#) | [Corresponding author](#)

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[Corrigendum \(February, 2016\)](#)

Anthelminthic treatment during pregnancy is associated with increased risk of infantile eczema: randomised-controlled trial results

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Cancer

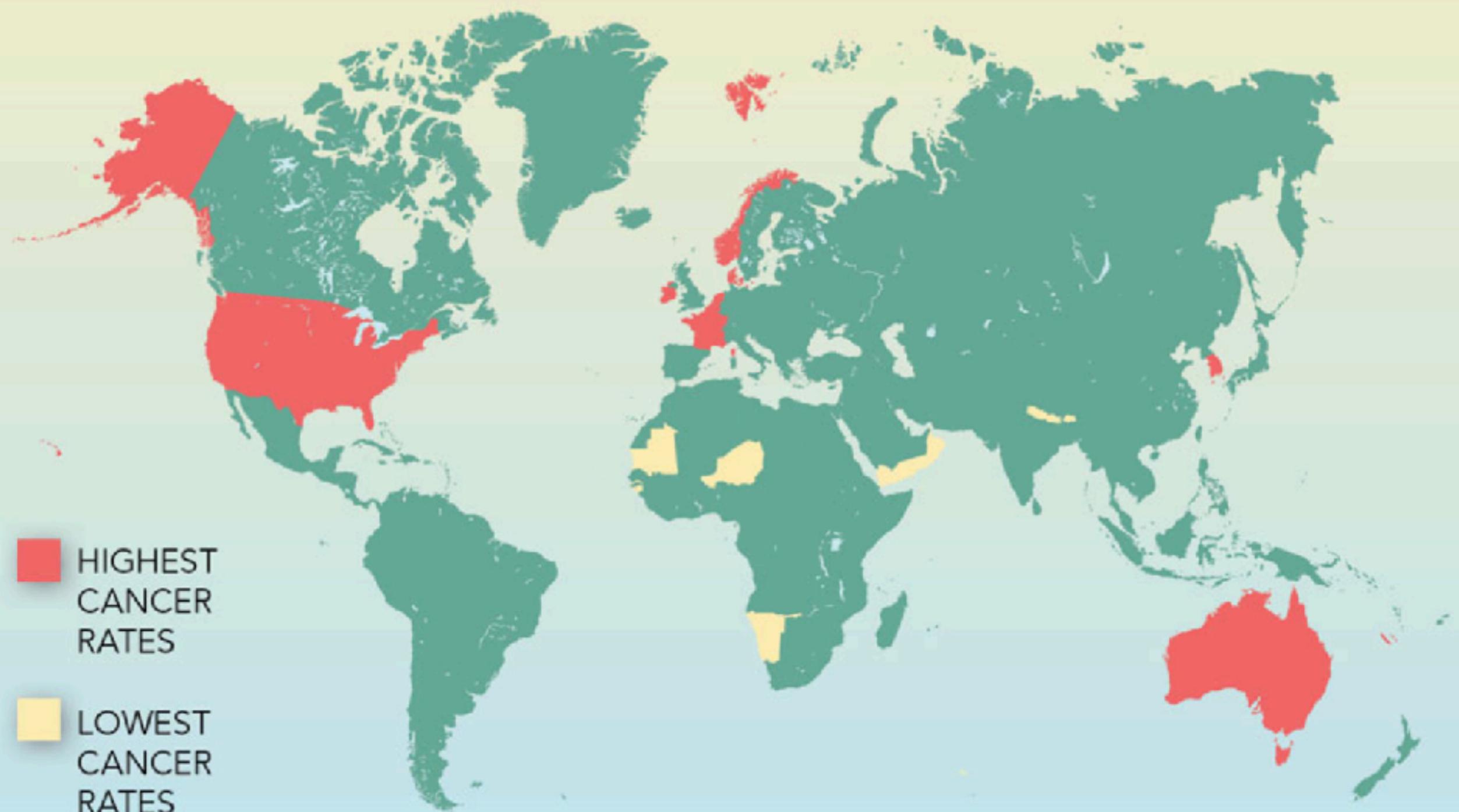
Multiple studies have shown an improved prognosis with tumor-associated tissue eosinophilia (TATE) or evidence of eosinophil degranulation in various types of solid tumors, including colon tumors (34, 35), oral squamous cell carcinoma (SCC; ref. 36), esophageal SCC (37), nasopharyngeal carcinoma (38), penile cancer (39), laryngeal carcinoma, pulmonary adenocarcinoma, bladder carcinoma (40), and prostate cancer (41). This beneficial influence of eosinophils in diverse tumors appears to be independent of other standard prognostic factors (e.g., stage, age, sex, alcohol or tobacco history, histologic grading, vascularization, vascular invasion, and neural invasion).

Antitumor responses

Antitumor cytotoxic responses via degranulation are suggested by the observation of granule proteins in the local vicinity of tumors (45), but the tumoricidal effects of eosinophils are not well understood. In mice with peripheral blood eosinophilia, there is a substantial decrease in both tumorigenicity and tumor progression concomitant with an abundant tumor eosinophilia.

In humans, eosinophils are frequently observed following immunotherapy with IL-2 (47, 48), IL-4 (49, 50), GM-CSF (51), or tumor vaccination (52).

A GLOBAL VIEW



Highest cancer rates in highly parasitic peoples cleared of their parasites.

COUNTRY RANKINGS

Highest Cancer Rates



Denmark



France
(metropolitan areas)



Australia



Belgium



Norway



United States



Ireland



Republic of Korea



Netherlands



New Caledonia

Lowest Cancer Rates



Niger



Gambia



Cape Verde



Bhutan



Yemen



Oman



Namibia



Guinea-Bissau



Nepal

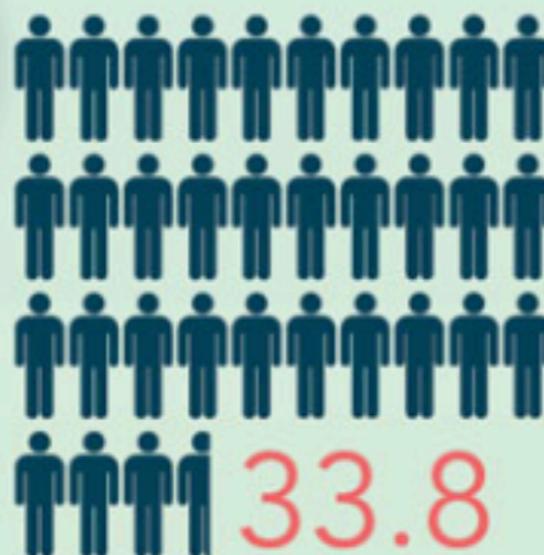


Mauritania

HIGHEST VS. LOWEST



Denmark



Niger



EQUAL TO 10 CANCER CASES
PER 100,000 PEOPLE



People with parasitic history cleared of their parasites.



People with parasites **not** cleared of their parasites.

Scientists Find Bacteria Where It Isn't Supposed to Be: The Brain

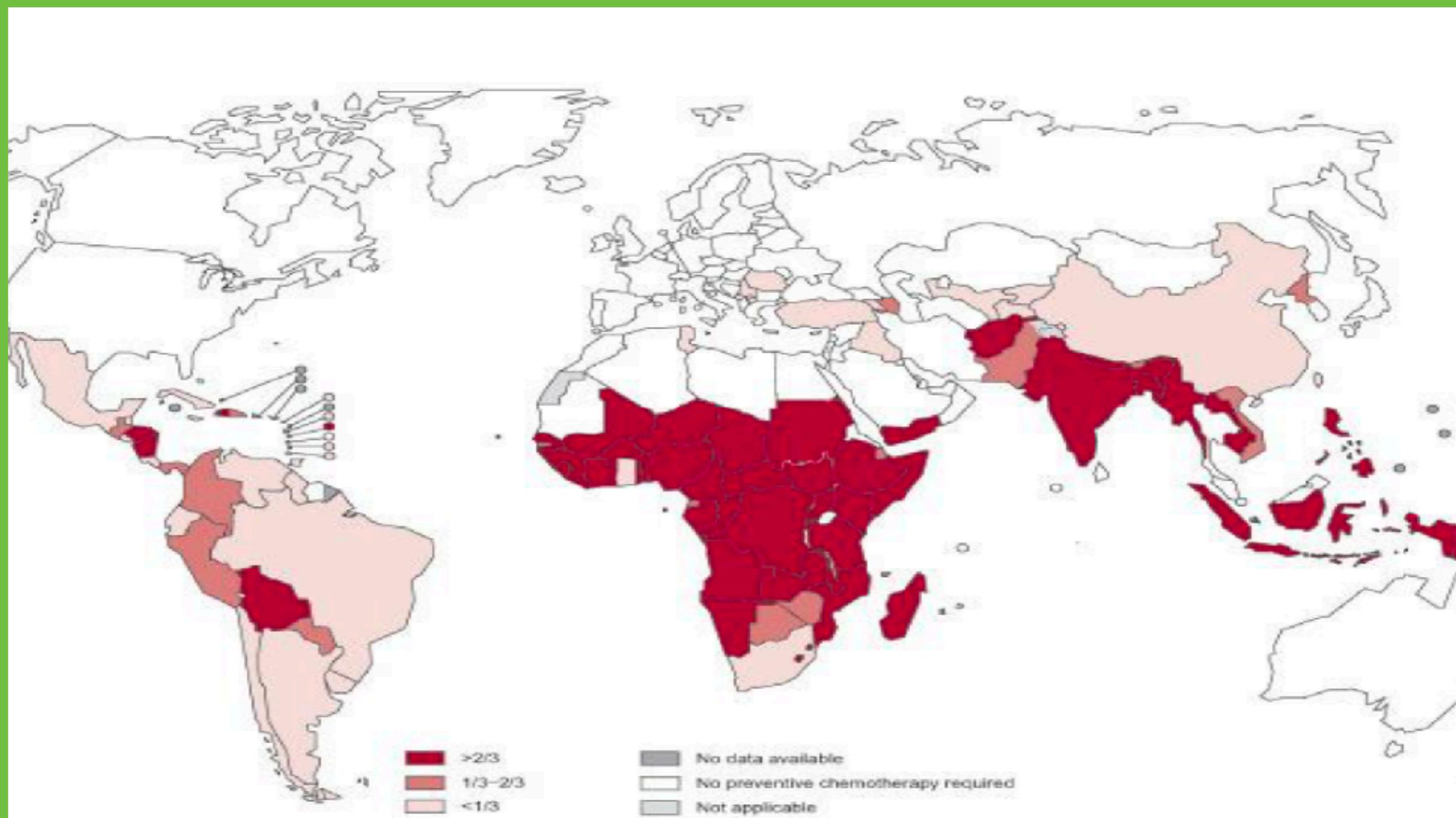
How are dirt molecules getting into white matter—and what are they doing up there?

By Amanda Schaffer.

AMANDA SCHAFFER 03.17.13 4:45 AM ET

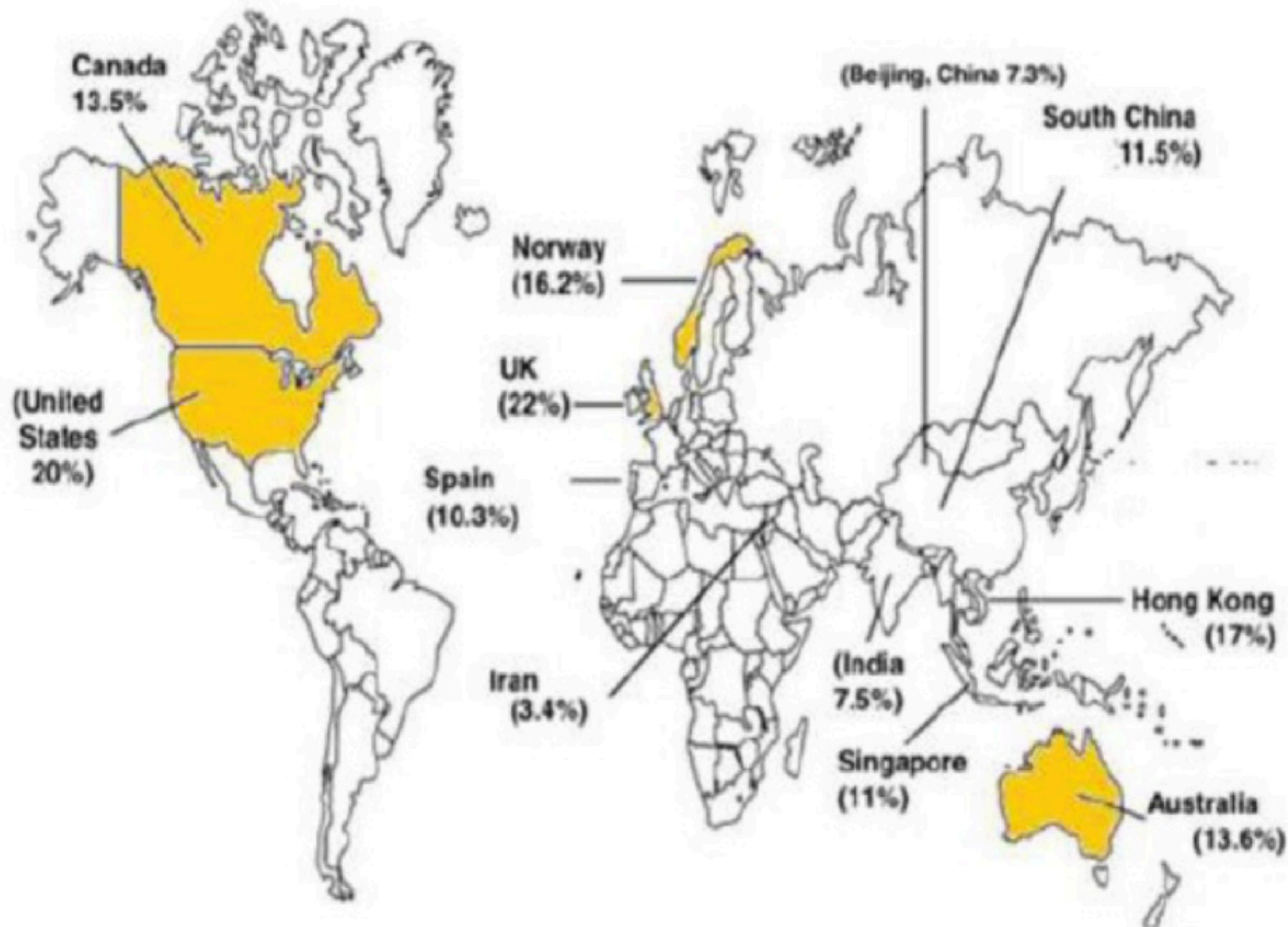
As anyone who's seen a yogurt commercial knows, our guts are teeming with bacteria. So, too, are our hands, feet, ears, and mouths.

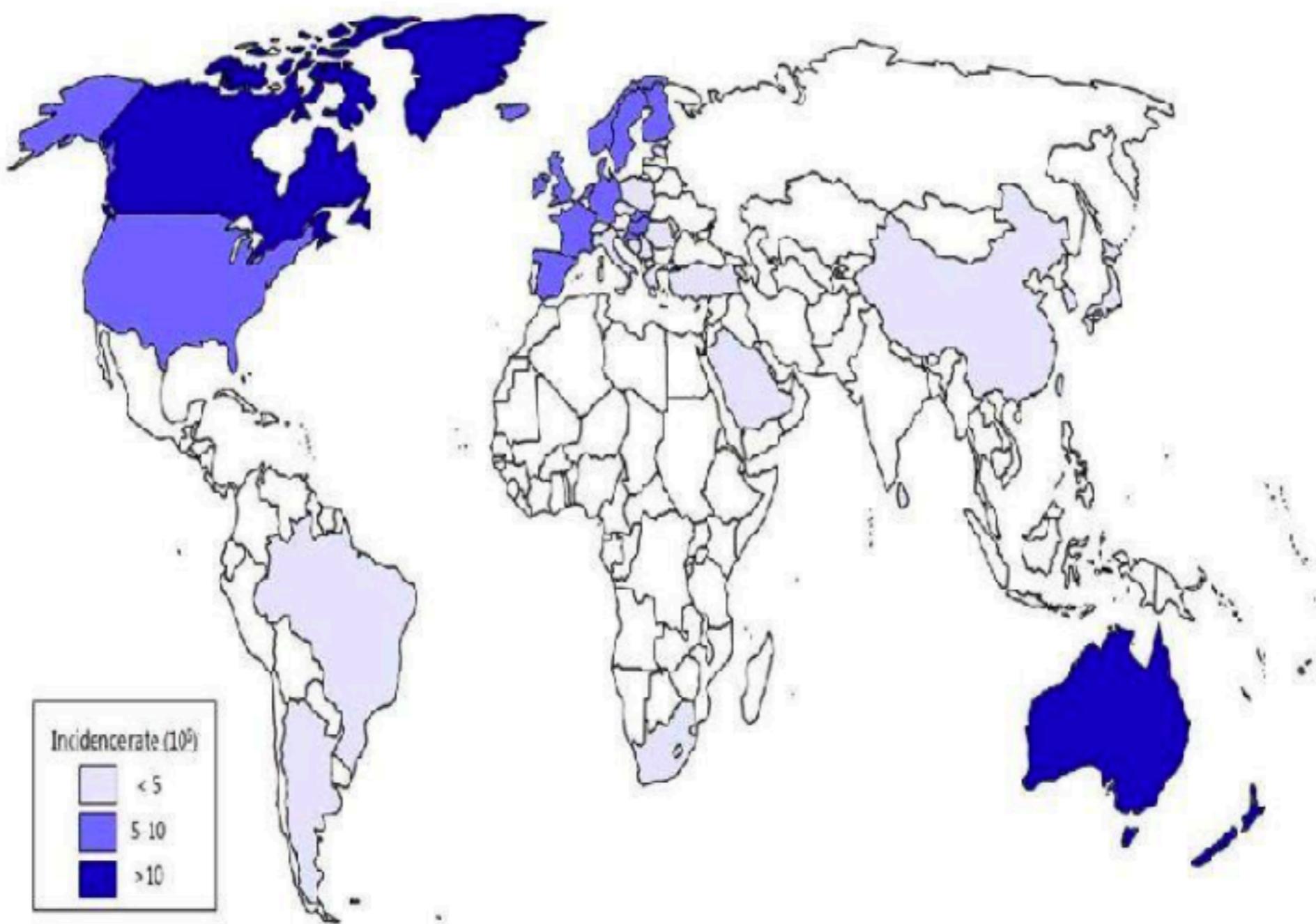




Global prevalence of Soil Transmitted Helminths (Source: World Health Organisation)

Common throughout the world affecting 10-15% of adult population





Medscape

Source: Gut © 2013 BMJ Publishing Group Ltd & British Society of Gastroenterology

Figure 3. Global prevalence of Inflammatory Bowel Disease (Source: BMJ Publishing Ltd & British Society of Gastroenterology).

Suppression of inflammatory immune responses in celiac disease by experimental hookworm infection.

McSorley HJ¹, Gaze S, Daveson J, Jones D, Anderson RP, Clouston A, Ruyssers NE, Speare R,
McCarthy JS, Engwerda CR, Croese J, Loukas A.

Author information

Abstract

We present immunological data from two clinical trials where the effect of experimental human hookworm (*Necator americanus*) infection on the pathology of celiac disease was evaluated. We found that basal production of Interferon- (IFN-)γ and Interleukin- (IL-)17A from duodenal biopsy culture was suppressed in hookworm-infected participants compared to uninfected controls. Increased levels of CD4+CD25+Foxp3+ cells in the circulation and mucosa are

CD4/CD8 Ratio Profile, NYSDOH

| | | | |
|--------------------------|------|-------------|----------|
| % CD 4 Pos. Lymph | 38.4 | | |
| % CD 8 Pos. Lymph | | 37.2 | H |
| CD4/CD8 Ratio | 1.03 | | |
| Absolute CD 4 Helper | 845 | | |
| Abs. CD 8 Suppressor | 818 | | |

The two types of hookworms

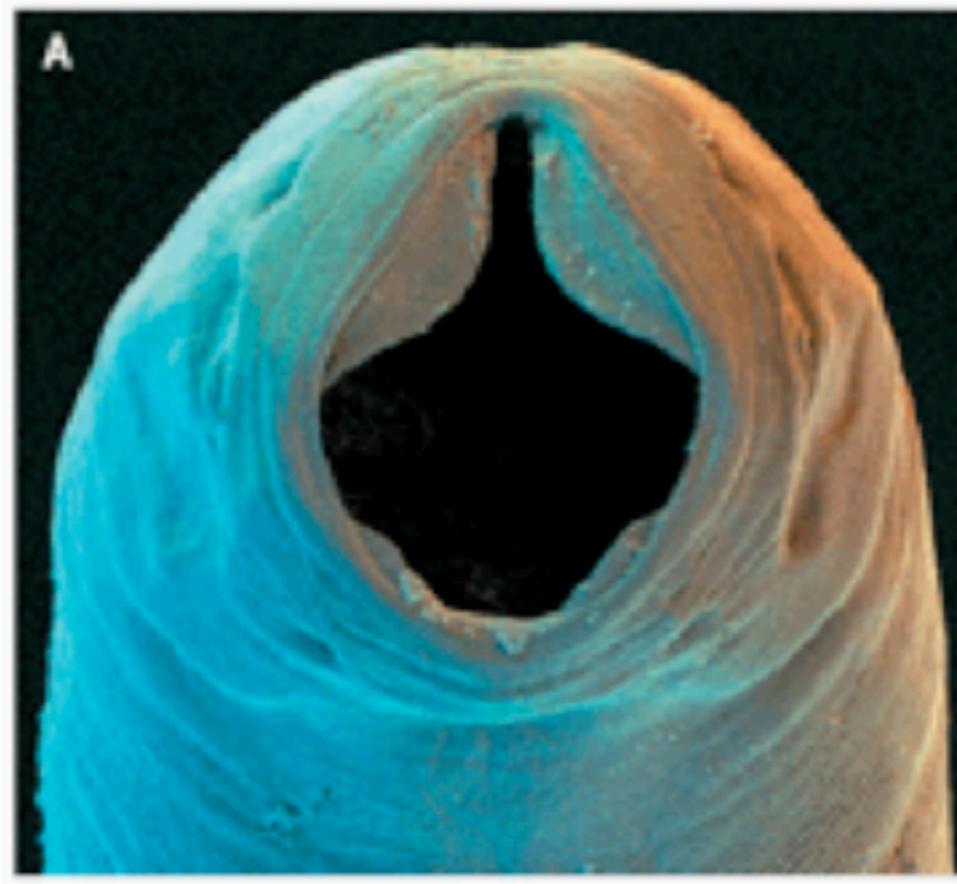


Figure 1. Teeth of *Ancylostoma* on the left and cutting plates of *Necator* on the right.

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CONCLUSIONS: The detrimental effects of treatment suggest that exposure to maternal worm infections in utero may protect against eczema and wheeze in infancy. The results for albendazole are also consistent with a direct drug effect. Further studies are required to investigate mechanisms of these effects, possible benefits of worms or worm products in primary prevention of allergy, and the possibility that routine deworming during pregnancy may promote allergic disease in the offspring.

Whipworm Eggs May Soothe the Stomach

Parasite eggs may soothe the stomach

Intestinal issues are not just for humans. Rhesus macaques living in captivity often develop chronic diarrhea similar to the human autoimmune condition ulcerative colitis. Now these animals are providing new insights about a cure for this condition in both species—and that cure is worms.

Small human trials have found that giving people pig whipworm eggs can reduce symptoms of inflammatory bowel disease (IBD). In developing countries where IBD is much less common, parasitic worms (helminths) are often endemic, perhaps conferring some benefit. But scientists have still been parsing out why the presence of these worms might work so well.

For the new study, P'ng Loke, an assistant professor of microbiology at New York University Langone Medical Center, and his colleagues selected five juvenile rhesus macaques with idiopathic (cause unknown) chronic diarrhea. Each monkey was fed 1,000 parasitic whipworm (*Trichuris trichiura*) eggs. After the treatment, four of the five monkeys had improved and regained weight. The findings were published online in *PLOS Pathogens*.

The researchers found that the ill monkeys started out with an abnormally high rate of bacteria attached to the mucosal membranes of their colon. After the treatment, bacterial communities in their colon had changed substantially, suggesting that exposure to helminths may help restore the balance of microbial communities in the gut.

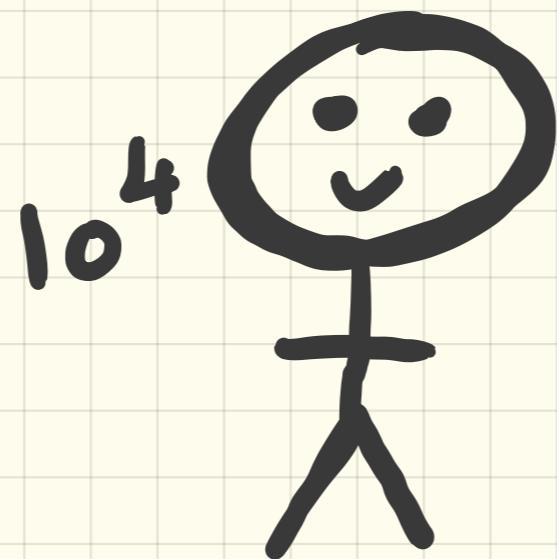
The team speculated that the presence of the parasite eggs stimulated extra mucus production and healing, in addition to renewing epithelial cells, which line the gut. These changes helped to reduce the quantity of bacteria that

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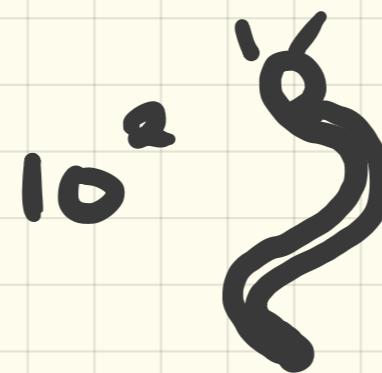
HEALING REQUIRES
A THREE LEGGED
Stool.



↑ ↑ ↑
Parasites bacteria. immune system.



HUMANS
SMARTEST ;)



WORMS
Smart ::



bacteria
dumb :/

bacteria

need organization



WORMS
ORGANIZE
BACTERIA



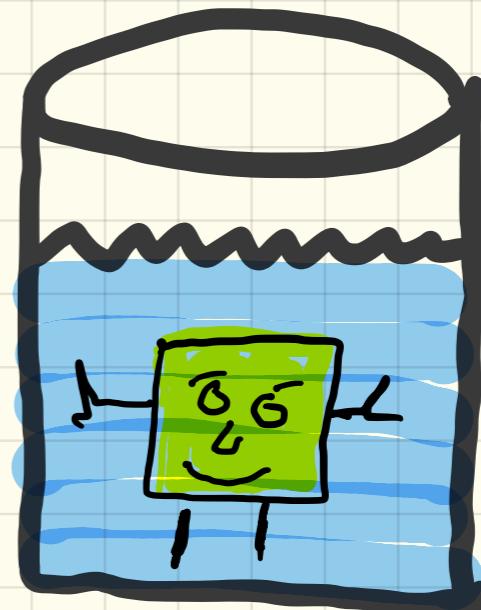
**OLD VIEW
OF BACTERIA
in the body.**

bacteria does not
enter sterile organs



LIKE
BRAIN
+
URINARY
TRACT

**NEW VIEW
bacteria is
everywhere.**

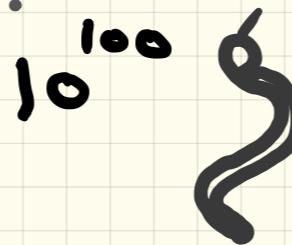


LIKE WATER
SATURATES A SPONGE

Worms have the
ability to organize
our bacteria.



HUMANS
SMARTEST :)



WORMS
Smart ::



bacteria
dumb ::

bacteria without
worm supervision build a
disorganized gut ecosystem.



worms organize
bacteria.



OLD VIEW OF BACTERIA

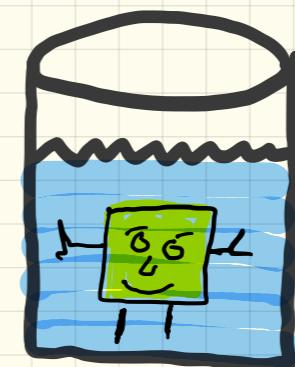
in the body.

bacteria does not
enter sterile organs



LIKE
BRAIN
+
URINARY
TRACT

NEW VIEW bacteria is everywhere.



LIKE WATER
SATURATES A SPONGE

HEALING REQUIRES
A THREE LEGGED
Stool.



↑ ↑ ↑
bacteria.
immune system.
Parasites

GENOMICS

When naturopathic
medicine doesn't work.



Two
legged
stool

LYME DISEASE:

PROPHYLACTIC:

ACUTE :

CHRONIC:

AUTOIMMUNE EXAMPLES

LYME DISEASE

- 1) Pharmacy option
- 2) naturopathic options
- 3) worm effects

CROHNS DISEASE

- 1) Pharmacy
- 2) naturopatic

COLITIS

- 1) Pharmacy
- 2) naturopathic
- 3) WORM

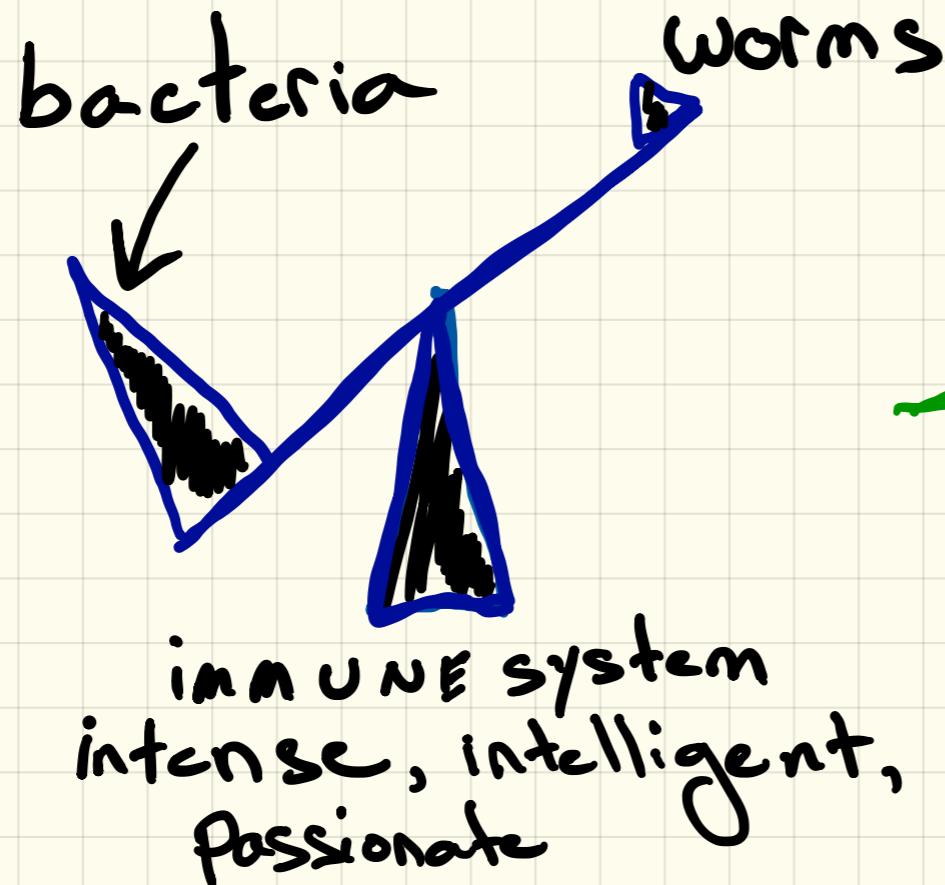
LYME DISEASE:

PROPHYLACTIC:

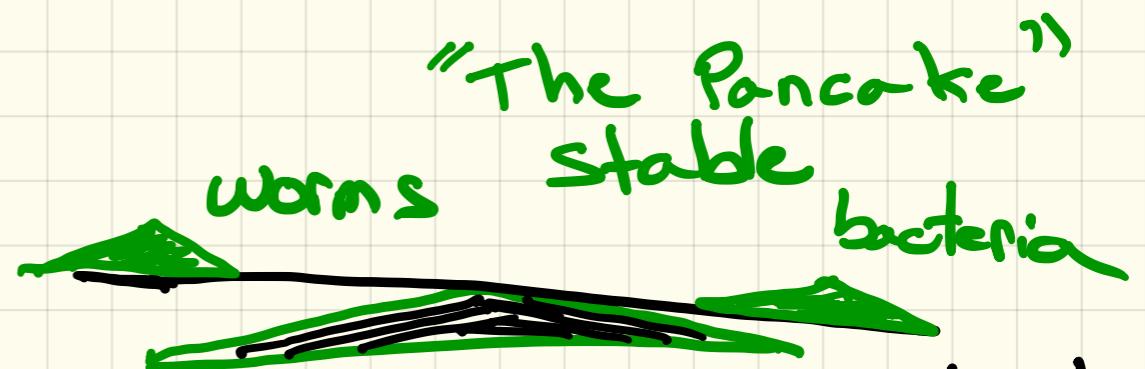
ACUTE :

CHRONIC:

The empire
Great
State building
Highs and lows



FACTORS IN AUTOIMMUNE DISEASE



not usually your patient
or anyone else's.