

# A Serious Case of Parasitic Infection

## **Tóm Lược**

*Ký sinh trùng sống nhờ trên một ký chủ (hay sinh vật) sống khác như súc vật và người. Ký sinh trùng sống với ký chủ, lấy thực phẩm từ ký chủ nhưng không góp phần vào sinh hoạt của ký chủ. Một số ký sinh trùng gây kích thích và trở ngại cho các chức năng cơ thể, một số tiêu hủy mô của ký chủ, và phóng thích độc tố gây tổn hại và bệnh tật cho ký chủ.*

*Bài viết này đề cập đến trường hợp một du khách người Mỹ gốc Việt trong một chuyến du lịch về Việt Nam, đã nhiễm phải bệnh giun đầu gai (Gnathostomiasis) gây nên bởi một loại ký sinh trùng đặc biệt do bệnh nhân ăn sống trái tim rắn hổ mang. Ký sinh trùng Gnathostoma spinigerum, một loại giun tròn đầu có móc đã xâm nhập qua đường tiêu hóa gây nhiều biến chứng như đau vùng gan, nổi mề đay ở chân, sốt, ớn lạnh nhiều vào buổi chiều tối. Số lượng bạch huyết cầu ăn phẩm eosin của người bệnh này lên cao đến 13,000 mili mét phân khối máu (13,000 mm<sup>3</sup>).*

*Sự chẩn định đúng bệnh và điều trị kịp thời với thuốc Albenza (albendazole) do lời khuyên của một ký sinh trùng gia thuộc Trung Tâm Kiểm Soát và Phòng Ngừa Bệnh Nhiễm Trùng đã chữa trị người du khách này hoàn toàn khỏi bệnh.*

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## **Abstract**

**P**arasites live off their animal or human hosts, which provide them with food and shelter without reciprocal benefits. They wreak havoc with their hosts' life processes by destroying cells or releasing toxic substances, thereby posing a life-threatening health hazard.

This article discusses a serious case of parasitic attack suffered by a Vietnamese-American visitor to Vietnam. By eating an uncooked cobra heart, he had allowed the Gnathostoma spinigerum, a roundworm with a hooked head, to invade his stomach, and cause swelling in the liver area, hives in the legs, fevers, and chills that worsen in the evening. His eosinophil count reached an abnormally high level of 13,000 per cubic millimeter of blood.

A correct diagnosis and timely treatment with the drug Albenza (albendazole), recommended by a parasitologist at the Center for Disease Control and Prevention, produced the final relief.

## **Background**

CN and his wife Q had just returned from a visit to Viet Nam. They spent four days in Ho Chi Minh City, where the various foods they ate were well cooked. When they visited Hue, they enjoyed local specialties, which were also well cooked. Their travel took them to Ha Noi, then to the seaside resort of Nha Trang. It was here that they ate some raw shrimp dishes. CN also took a one-kilometer swim in the sea.

Back in HCM City, CN joined a group of men friends in a drinking party during which delicacies such as frog, field mice, lizard, and cobra were served. All of these were well cooked with the exception of the snake bile, which was consumed raw with rice wine. On the instigation of local friends, CN also ate a raw snake heart, on the theory that it is a kidney tonic and an aphrodisiac.

## Development of the Infection

Four days after returning to the United States, CN took seriously ill, drained of his normally bubbling energy, and was confined to bed. He suffered from mild fever and his body temperature reached 103 degrees F. His condition was more tolerable in the morning than in the evening, when the hives broke out in his legs. There were nights when he felt pain in the right quarter of the area of his liver, and chills that required overheating in his room and several layers of blanket to stabilize his condition. Antibiotics did not seem to work. His bodily functions, such as urinating and bowel movements, were normal. His skin and eyes did not show any yellowing effect. An examination of his ears, nose and throat (ENT) was normal. There was no stiff neck. The white blood cell count was only slightly elevated. A blood test to determine malaria infection turned out negative, although there was an unusually high leucocyte count of 26,000, more than half of which consisted of eosinophils.

Eosinophils (E) are white blood cells distinguished by the presence in their cytoplasm of coarse granules that stain orange red with Wright's or Giemsa stains. Although the function of eosinophil is poorly understood, it is known for its ability to ingest foreign particles ranging from pollen to impurities from pets. The eosinophils release various substances from their eosinophilic granules. These include major basic protein (MBP), cationic proteins, peroxidase, arylsulphatase B, phospholipase D and histaminase. The granule contents are capable of damaging a parasite's membrane.

If this reaction occurs in the respiratory tract, the patient will experience profuse eye tearing, red itchy eyes, a runny and irritated nose, and sometimes hard breathing symptomatic of asthma. The eosinophil level is particularly high in cases of infection by roundworms and tapeworms. In developed countries, where hygiene standards are high, this level rarely exceeds 300/mm<sup>3</sup> of blood.

## Diagnosis and Treatment

Dr. Pamela Nagami, a specialist in Infectious Diseases who treated CN, stated that his complete blood count with 13,000 E per mm<sup>3</sup> was among the highest she had ever seen.

Dr. Nagami conducted a thorough review of CN's travel history, as described above, paying particular attention to his diet, sleeping, and bathing habits, because Viet Nam is known for tropical fever, typhoid fever and worm infection. Since CN turned up negative in malaria testing, and had taken antibiotics, her focus was on worms.

Of the four known filaria that infest the blood stream through mosquito bites, Viet Nam has two, which are prevalent in the north. In filariasis, the female mosquito releases, depending on the timing of the bites (day or night) thousands of what are considered to be pre-larval stages, which still retain the egg membrane, referred to as microfilariae. In case of *Wuchereria bancrofti*, the larvae introduced in the human body by bites from the female mosquito make their way through the peripheral lymphatics to the larger vessels where they reach maturity. The adult worms damage the lymphatic valve system causing the lymph to drain to the extremities, and hence invading and swelling the subcutaneous tissues. This condition is known as elephantiasis, which is accompanied by high fever, chills, and a high E level. Since CN had no reddening or swelling of lymph nodes, Dr. Nagami eliminated filariasis as a possible cause.

Next Dr. Nagami considered trichinosis, an infestation caused by ingestion of undercooked food. In this case the larvae could traverse the walls of the intestines and reach other muscles, where they cause abnormally high CPK (creatine phosphokinase) and E levels. Since CN's blood test did not show a high CPK level, trichinosis was also eliminated.

The third condition, schistosomiasis, a blood fluke which infests more than 200 million people around the globe, is caused by quarter- or half-inch-long worms with a complex life cycle, and carried primarily by fresh-water snails. Infestation does not take place by direct contact with the snails. Instead the larvae travel through fresh water and penetrate the skin of swimmers and farm workers. Although CN took a swim off the Nha Trang beach, the condition was not entirely out of the question since he also did eat raw shrimp. Nagami also considered *Paragonimus westermani*, a kind of flat lung fluke that might have been ingested along with raw fresh water crayfish or crab infected with metacercariae. Millions of Far Eastern inhabitants suffer from this condition, which cause chronic bloody coughs. CN did not have any coughs, and hence could not have paragonimiasis.

An important fact to note is that CN was the only person affected among others, including Q and his cousins, during their Viet Nam trip. The only difference is CN had eaten raw snake, which seems to indicate that parasites in snakes must be investigated. There are cases of incidental infestation through parasites. Two came to mind: *Spirometra*, a tape worm, and *Gnathostoma*, a round worm, both carried by pets such as cats, dogs, and other mammals.

The *Spirometra mansonoides* causes a strange eye infection known as sparganosis. In Viet Nam, particularly in the countryside of the north and central regions, peasants of half a century ago would use poultice made from a frog's leg muscles to treat open wounds and eye diseases for its refreshing effects. The larvae would have a chance to infest the areas around the eyes. Eating a raw or undercooked infected frog, snake, or small mammal would expose humans to the same risk. The patient exhibits high E level and fever. When the infestation reaches the intestines and other tissues, it

accounts for painful swelling. Under surgical procedure the gleaming white and slow-moving worms are found. CN could be infested by the *Spirometra*.

The last diagnostic test would involve the *Gnathostoma spinigerum*. The *Gnathostoma* sp., which can mature only among dogs and cats and certain wild mammals such as tigers, leopards, lions, minks, otters, opossums, and raccoons, is able by transmission through various agents from feces to cyclops to fish, frog or snake, to infest humans who ingest the latter raw or undercooked. The *Gnathostoma* sp. clings to the stomach walls of their hosts by means of hooks in their heads, and upon maturity lays eggs. Tiny-eyed cyclops in fresh water eat these eggs, and are in turn eaten by fish, frogs, and snakes. The parasitic eggs are thus transmitted from animal to animal.

When CN ate the snake's heart, the larvae were released through digestion into his stomach. And because CN is not a natural host, such as a dog or a cat, the larvae, which have an expected life of up to ten years, had to pass through his stomach to migrate into the abdominal cavity and aimlessly wander into his liver and other subcutaneous organs. If they reached the brain there is no telling what the consequences would be. CN exhibited all the signs of fever, pain in the liver area, hives, and one of the highest E levels ever recorded. Finally Nagami appealed to the Center for Disease Control and Prevention in Atlanta, where parasitologist Sue Partridge concurred with Nagami's diagnosis and suggested the anthelmintic albendazole (Albenza).

Although the CDC has no blood tests for gnathostomiasis, a research center in the School of Tropical Diseases in Bangkok, Thailand, has the facility for such tests under the direction of Dr. Wanpen Chaicumpa.

Due to bureaucratic procedures at the Bangkok Airport, two blood samples from CN had to be mailed to Dr. Wanpen Chaicumpa before he received the sample. While waiting for the test result, the drug albendazole was administered. After two days CN showed signs of progress. Although the E level was at 25,000, other tests for dengue fever, amebiasis (*Entamoeba histolytica*), and fecal inspection all turn up negative. As CN continued steady progress toward recovery,

night fever began to abate.

About two weeks later, CN's wife reported to Nagami the appearance of a red swelling the size of a small egg on the left side of his stomach. A week later, the swelling was removed surgically. Under the microscope the two-centimeter-long hard sample showed live tissues filled with E. Deep under the skin is a tunnel running the length of the sample littered with dead tissues. There were no worms, no hooked heads, no cuticles, indeed, nothing at all. The quarter-inch-long worms had dug a tunnel through his tissues, and had apparently vanished without a trace, leaving behind a trail of E in hot pursuit.

Weeks later Dr. Wanpen Chaicumpa's tests came through. They showed positive results for *Gnathostoma spinigerum* under the Western blot analysis.

As for the worms, Nagami conjectured that they had disappeared, killed by the drug albendazole. In fact, after several months CN's level of eosinophils has gradually become normal.

## Conclusion

Thanks to the dedication and professional competence of Dr. Nagami and associates, and the help from the CDC, gnathostomiasis had been correctly diagnosed, the drug albendazole (Albenza) appropriately administered, and CN's health completely restored.

## Comment

It is important when traveling to South America, Central Africa, the Middle East, India, and South East Asia to take all the immunizations recommended by the CDC, and to exercise caution about foods and drinks. Visitors to those areas should be vigilant about infectious diseases, such as malaria, cholera, typhoid fever, etc., as well as diseases caused by helminths, such as nematodes, flukes, and tapeworms, which can infest humans through raw or undercooked food. And if they experience discomfort upon their return home, they should immediately seek medical treatment and inform their physician of the places they have visited.

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