Outbreak of Human Infection with *Sarcocystis nesbitti*, Malaysia, 2012

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An outbreak of fever associated with myalgia and myositis occurred in 2012 among 89 of 92 college students and teachers who visited Pangkor Island, Malaysia. The *Sarcocystis nesbitti* 18S rRNA gene and sarcocysts were obtained from muscle tissues of 2 students. Our findings indicate emergence of *S. nesbitti* infections in humans in Malaysia.

Sarcocystis spp. infections are emerging parasitic infections among travelers to potentially disease-endemic areas of Southeast Asia. More than 100 travelers acquired an acute, muscular, *Sarcocystis* spp. infection–like illness while traveling to and from Tioman Island, Malaysia, during 2011–2012 (*1*). Several cases were histologically confirmed by detection of intramuscular sarcocysts. Before these reports associated with travel to Tioman Island, <100 cases of intramuscular infection with *Sarcocystis* spp. had been reported (*2–4*) in humans. Earlier studies with tongue tissues obtained in an autopsy series suggested an infection prevalence of ≤21% among Malaysians (*5*). However, routine diagnostic examination of >1,500 limb muscle biopsy specimens in the past 20 years for various muscle diseases at the University of Malaya Medical Centre did not yield any sarcocyst-positive tissues (K.T. Wong, unpub. data). This finding suggests that human infection with *Sarcocystis* spp. is rare or that most of the infections are silent, mild and self-limited (*6*), or under-recognized.

There are >100 *Sarcocystis* spp. known and most have been isolated from muscle tissues of various intermediate hosts, including mammals, birds, and reptiles. *Sarcocystis* spp. are parasites with dual hosts to accommodate their dual life cycles. The sexual reproductive stage occurs in the definitive host, which appears to be relatively species constrained. During this stage, parasite activity is limited to the intestinal tract. In contrast, the asexual reproductive stage occurs in the intermediate host and appears to be relatively less species constrained. This stage occurs in the vascular endothelium and culminates in formation of mature muscle sarcocysts (*6*). However, *Sarcocystis* spp. infections in humans as the accidental intermediate host have been reported as intramuscular sarcocysts of unknown species (*7*).

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The Study

An outbreak investigation was undertaken after 89 symptomatic persons from Malaysia came to our institute after a college retreat during January 17–19, 2012, on Pangkor Island, Malaysia (4°13′ 52.35″N, 100°32′ 44.55″E). Ninety-two persons attended the retreat, which was held in a small hotel on the coast of the island; all outdoor activities were conducted on the beach or in the ocean. Eighty-nine symptomatic case-patients were identified with onset of fever (94%), myalgia (91%), headache (87%), and cough (40%) ≤26 days upon return. In persons who had a fever, the fever had a relapsing-remitting nature in 57% of patients.

Investigation by using magnetic resonance imaging (MRI) was prompted by development of visible swelling of the face in 9 patients and swelling of the calf muscles in 4 patients. Eight patients who had facial swelling and myalgia for 4–6 weeks underwent whole-body MRI by using the 1.5T Signa HDx MR System (GE Healthcare, Pittsburgh, PA, USA). All 8 patients showed changes in muscles of mastication, including superficial temporalis and deep temporalis, and in masseter muscles. Abnormalities were also observed in back muscles in 4 patients and in calf muscles in 2 patients. Muscle affected showed asymmetric high signal intensities on T2-weighted short T1 inversion recovery, consistent with inflammatory edema. A biopsy specimen was obtained from the temporalis muscle of 1 of these patients. Two leg muscle biopsy specimens were obtained from 2 other patients who reported specific muscle pain and had changes consistent with myositis by MRI. Mild myositis (inflammation) was observed in 3 muscle biopsy specimens examined.

Muscle tissues were ground with sterile glass beads by using a Precellys 24 homogenizer (Bertin Technologies, Montigny le Bretonneux, France) at 5,500 rpm for 30 s. Ten microliters of homogenates was inoculated into various cell cultures for virus isolation. Virus was not isolated from homogenates. RNA and DNA were also extracted from tissue homogenates by using the QIAamp Viral RNA Mini Kit and QIAamp DNA Mini Kit (QIAGEN, Hilden, Germany), respectively. PCR amplification for detection of infectious agents was performed. No specific amplification was obtained by using available primers for commonly detected viruses, including alphaviruses and other arboviruses.