

# Sarcocystosis

## Epidemiology

Human infection is considered rare with less than 100 published cases of invasive disease (about 46 cases reported by 1990). These figures represent a gross underestimate of the human burden of disease.

The extremes of age reported to date are a 26-day-old infant and a 75-year-old man. Infections have been reported from Africa, Europe (Germany, Spain and Poland), the United States (California), Central and South America, China, India, Tibet, Malaysia, and Southeast Asia.

Stool examinations in Thai laborers showed that sarcocystis infection had a prevalence around 23%. Virtually all cases appeared to be asymptomatic, which probably explains the lack of recognition. A study of 100 human tongues obtained *post mortem* in Malaya revealed an infection rate of 21%. No sex difference was found and the age range was 16 to 57 years (mean 37.7 years).<sup>[9]</sup>

An outbreak affecting 93 persons was reported in 2012 in Malaysia.<sup>[10]</sup> *Sarcocystis nesbitti* was confirmed to the cause in several cases.

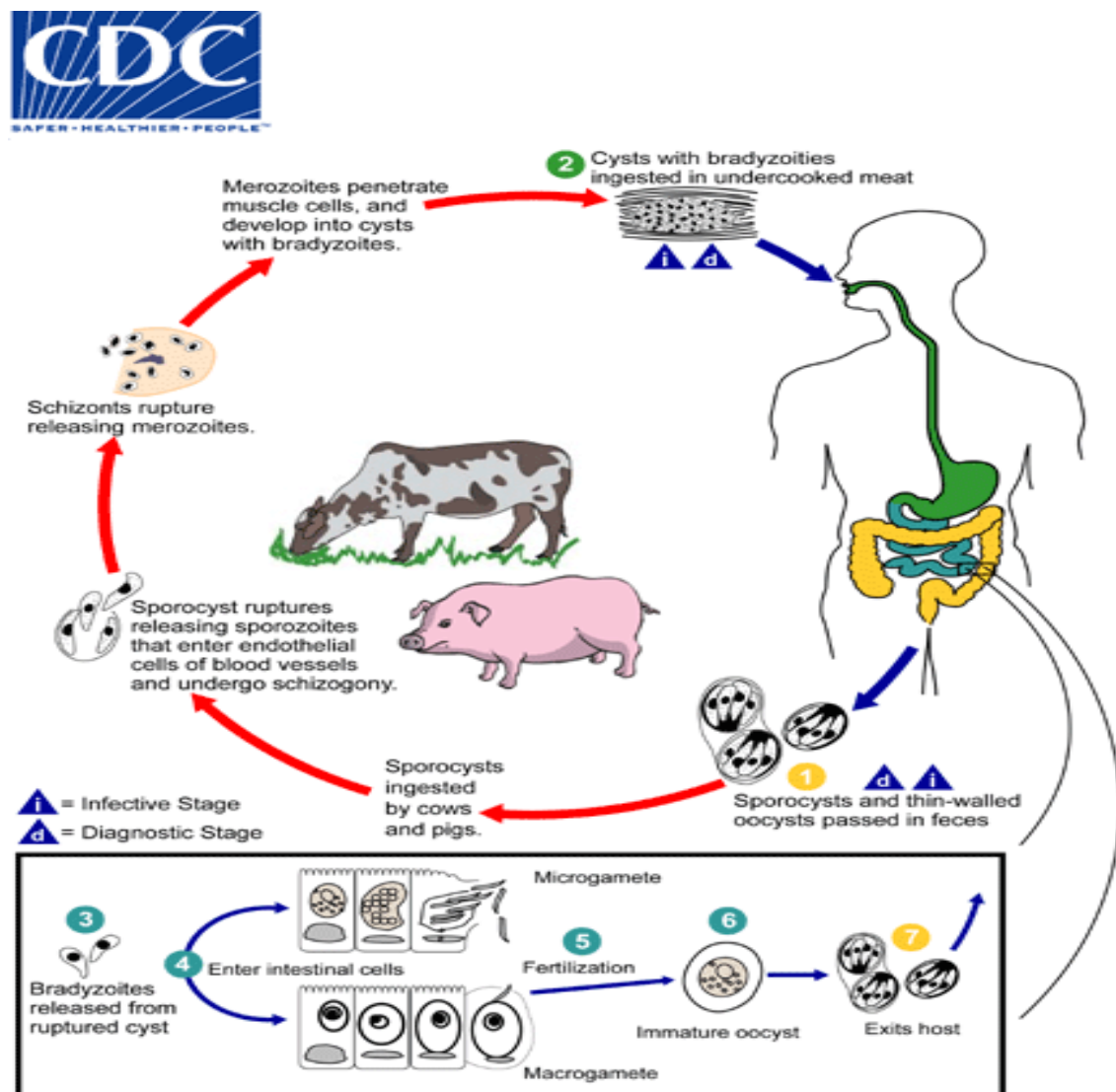
## Causal Agents

*Sarcocystis hominis* and *S. suihominis* use humans as definitive hosts and are responsible for intestinal sarcocystosis in the human host. Humans may also become dead-end hosts for non-human *Sarcocystis* spp. after the accidental ingestion of oocysts.

## Life Cycle

Both sporulated oocysts (containing two sporocysts) and individual sporocysts can be passed in stool 🟡. Sporocysts contain four sporozoites and a refractile residual body. Sporocysts ingested by the intermediate host (cattle for *S. hominis* and pigs for *S. suihominis*) rupture, releasing sporozoites. Sporozoites enter endothelial cells of blood vessels and undergo schizogony, resulting in first-generation schizonts. Merozoites derived from the first-generation invade small capillaries and blood vessels, becoming second-generation schizonts. The second generation merozoites invade muscle cells and develop into

sarcocysts containing bradyzoites, which are the infective stage for the definitive host ②. Humans become infected when they eat undercooked meat containing these sarcocysts. Bradyzoites are released from ruptured cysts in the small intestine ③ and invade the lamina propria of the intestinal epithelium ④. There, they differentiate into macro- and microgametocytes. Fusion of male and female gametes ⑤ results in the formation of oocysts ⑥. Oocysts sporulate in the intestinal epithelium and are shed from the host in feces ⑦. Due to the fragile nature of the oocyst wall, individual sporocysts may also be detected in feces.



## Geographic Distribution

Worldwide, but more common in areas where livestock is raised.

## Clinical Presentation

In cases of intestinal sarcocystosis, when humans serve as the definitive hosts, infections are often asymptomatic and clear spontaneously. Occasionally, mild fever, diarrhea, chills, vomiting and respiratory problems may occur. When humans become infected with sarcocysts of non-human species, the infections are not intestinal but rather result in muscle cysts; symptoms such as myalgia, muscle weakness and transitory edema may occur. In these cases, humans are dead-end intermediate hosts.

### **Laboratory Diagnosis**

For intestinal sarcocystosis caused by *S. hominis* and *S. suis*, diagnosis is made by the observation of oocysts or sporocysts in stool. They are easily overlooked as they are often shed in small numbers. Also, the two species cannot be separated by oocyst or sporocyst morphology. When humans serve as dead-end hosts for non-human *Sarcocystis* spp., diagnosis is made by the finding of sarcocysts in tissue specimens.

### **Treatment**

Because infection is rarely symptomatic, treatment is rarely required. No trials have been published, so treatment remains empirical. Agents that have been used include albendazole, metronidazole, and cotrimoxazole for myositis. Corticosteroids have also been used for symptomatic relief.

Amprolium and salinomycin were effective in preventing severe illness and death in experimentally infected calves and lambs. These agents have not been tried in humans to date.

### **Prevention**

Infection can be prevented by cooking the meat before eating. Alternatively, freezing the meat at  $-5^{\circ}\text{C}$  for several days before ingestion kills the sporocysts.