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Salmonellosis: Possible Transmission from Horse to Human to Dog of Infection

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Introduction

Salmonellosis represents a major zoonotic disease, common in horses and dogs. Both species may serve as reservoirs of infection for man. The probable transmission of *Salmonella typhimurium*, var. copenhagen from horse to human to dog is reported.

Epizootiology/Epidemiology of the Infections: A 4-year old, thoroughbred gelding was admitted to the Purdue Veterinary School Clinic on June 11, 1976. The horse developed a profuse diarrhea on June 16 and died on June 20. Salmonellae, which unfortunately were not serotyped, were isolated directly on brilliant green plates (DIFCO) from the animal's feces on June 16. Selenite broth cultures were also positive. Identification of the enteric isolate was made based on the biochemical criteria of Edwards and Ewing.[1]

During the period June 16–20, a female student medicated and cared for the equine case. She had oral contact with a stomach tube used to medicate the animal on four occasions. She also consumed soft drinks during several nights' vigil caring for the animal.

On June 18, 1976, she became suddenly and acutely ill, with moderately severe abdominal pain, nausea, vomiting, profuse and uncontrollable diarrhea, fever (102°F), as well as severe generalized aching. She was examined by a physician on June 21. She indicated that the symptoms were not subsiding. Her temperature was 98.4°F; very low pelvic cramping was experienced, and a minimal vaginal discharge was present. Blood pressure was 126/74; evidence of dehydration and hyperactivity of the gastrointestinal tract were noted. Other findings were unremarkable. Stool and vaginal samples were obtained for bacteriological examination. Both specimens were positive for *S. typhimurium*, var. copenhagen. Stools were again cultured on July 1 and July 2. The same serotype was again isolated on direct culture on brilliant green agar. *Salmonella* isolation and identification techniques have been described previously.[1, 2] The antimicrobial sensitivity patterns[3] are presented in Table 1.

Amoxicillin was prescribed orally, 1 g. Q.I.D. on June 21 for a period of ten days, and the patient was asked to return for a follow-up examination. She returned on July 7 and was improved; however, the intermittent cramps continued, while the diarrhea had ceased.

TABLE 1—Antibiograms of Salmonellae Isolates.

Antimicrobial	Horse Feces 6/18	Human Vagina 6/21[a]	Human Feces 7/1 + 7/2[a]	Human Vagina 7/7[a]	Pup Feces 8/3[a]
	Sensitivity				
Ampicillin (10 mcg)	R	—	R	R	R
Chlortetracycline (30 mcg)	R	R	R	R	R
Chloramphenicol (30 mcg)	R	R	R	R	S
Furadantin/Macrodantin (300 mcg)	S	S	S	S	S
Kanamycin (30 mcg)	R	R	R	R	R
Neomycin (30 mcg)	R	R	R	R	R
Gentamicin (10 mcg)	R	R	R	R	S
Polymyxin B (300IU)	S	S	S	S	S
Streptomycin (10 mcg)	R	R	R	R	R
Triple Sulfonamides (1 mcg)	R	R	R	R	R
Nalidixic Acid (30 mcg)	—	—	S	S	S

[a] *S. typhimurium*, var copenhagen isolated
R = Resistant at level
S = Sensitive at level

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The patient owned two dogs: a 4-year old, mixed breed, spayed bitch and a 4½-month old mongrel female. Both dogs were housed in the patient's apartment. Moist commercial dog food was left each day for the animals to consume *ad lib*. Both canines appeared normal. The older dog was known to drink from the commode in the apartment. Feces from the animals were cultured for salmonellae on July 8. The elder dog was negative; however, *S. siegburg* was cultured from the pup's feces. On July 13 stool cultures from the younger animal yielded both *S. siegburg* and *S. binza*. On August 3, *S. typhimurium*, var. copenhagen was cultured from the young dog's stool. The antibiogram of the isolate from the pup was sensitive to both gentamicin and chloramphenicol; otherwise the pattern was the same as that of the horse and human isolates.

A veterinary instructor owned the dam and sire of the pup and had raised the young animal owned by the patient. Feces from the veterinarian as well as those from the dam were cultured on July 19. The owner's stool was negative, but *S. siegburg* was isolated from the bitch. On August 3 feces from both the dam and sire of the pup were cultured. *S. cubana* was isolated from the dam, while *S. siegburg* was obtained from the sire on direct culture on brilliant green plates.

The sequence of events relating to the equine, human and canine cases is presented in Table 2.

Discussion

Dogs have been shown to harbor at least 53 salmonellae serotypes.[4] Canines have served as sources for at least 10 human outbreaks according to one review of the subject.[2]

Salmonella infected or contaminated equine meat may serve as a source of human salmonellosis if consumed.[5] Horsemeat is not commonly a part of the human diet in the US; however, it is often an important constituent, either raw or processed, in foods for dogs and cats as well as for mink, foxes, and other captive carnivores. Infected or contaminated meat or by-products, therefore, may serve as sources of *Salmonella* for the lower animals and thus represent a potential human health hazard.[6, 7]

Veterinarians and others in intimate contact with horses may expose themselves to possible infection. Several such incidents have been reported.[a, 8, 9]

The probable source of the human salmonellosis described in this brief was a horse with fatal, acute salmonellae infection. However, the gelding and the human patient may have acquired the *Salmonella* independently from the clinic environment. Unfortunately, the isolate was not available for serotyping.

The puppy, in all probability, became infected with *S. typhimurium*, var. copenhagen from the carrier owner. Two other serotypes (*siegburg* and *binza*) were cultured from the puppy's feces. *S. siegburg* was also cultured from the feces of both the young dog's parents. The dam also harbored *S. cubana*. Possible sources of these serotypes in the environment is not known. Unfortunately, the feeds fed the dogs were not available for bacteriologic examination.

[a] Griffith, D. Personal Communication, Purdue University, 1975.

TABLE 2—Sequence of Equine, Human, and Canine *Salmonella* Infections.

Subject	Date	Status	Bacteriological Examination
Horse	6/11	admitted to Clinic	—
Human Patient (N.T.)	6/16-6/20	attended equine patient which had acute diarrheal syndrome	—
Horse	6/18	Feces cultured	salmonellae +
Horse	6/20	died	—
Human (N.T.)	6/18	acute symptoms developed	—
	6/21	symptoms continued—examined by physician	feces and vaginal swab: + *S. typhimurium*, var. copenhagen
	7/1 + 7/2	symptoms moderating	feces: + *S. typhimurium* var. copenhagen
	7/7	mild symptoms continuing—(duration symptoms; total 3 wks)	
	7/18; 8/15; 9/10; 9/28 and 10/4	patient asymptomatic	feces: negative on 5 samples
Pup (N.T. owner)	7/8	normal	feces: + *S. siegburg*
	7/13	normal	feces: + *S. siegburg* & *S. binza*
	8/3	normal	feces: + *S. typhimurium*, var copenhagen
	9/10 + 9/27	normal	feces: negative
Dog (N.T. owner)	7/8	normal	feces: negative
Dam (of N.T. pup)	7/19	normal	feces: + *S. siegburg*
	8/3	normal	feces + *S. cubana*
Sire (of N.T. pup)	8/3	normal	feces: + *S. siegburg*
Human (owner, dam and sire of N.T. pup)	7/19	normal	feces: negative

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The Surgeon General Speaks—Thirty Years Ago

Adequate medical care for all must be the cornerstone of any program designed to meet the health needs of the nation, and this means that medical care must be based on need for services rather than on ability to pay. One of the first problems we must solve, therefore, is that of finding a more efficient method of financing medical care. This problem has produced more thought and discussion than any other single health issue within my memory. Fortunately the areas of agreement have now assumed a dominant role. It is generally accepted that means must be found to make adequate medical care available to the entire population. Leaders in Congress, representatives of professional, national, and official health organizations all are working toward a legislative vehicle designed to help us reach this common goal.

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