

# Prevalence of *Salmonella* Typhimurium DT104 and Related Phage Types from NARMS-EB, 1997-2000

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**Introduction:** While antimicrobial resistance is recognized as a global problem, multiple resistances are occurring more frequently. In the mid-1990s a penta-resistant *S. typhimurium* Definitive Type 104 (DT104) reached epidemic proportions in the United Kingdom in both humans and animals. The National Antimicrobial Resistance Monitoring System (NARMS) was established in 1996 in the United States to provide descriptive data on the extent and temporal trends of antimicrobial susceptibility in zoonotic enteric pathogens from human and animal populations. As part of this system, the prevalence of DT104 among animal isolates was determined.

**Material and Methods:** *Salmonella* isolates of animal origin were tested using Sensititre™ (TREK Diagnostic, Westlake, OH) custom designed microtiter plates to determine minimal inhibitory concentrations for 17 antimicrobials. Swine isolates were obtained from federally inspected slaughter and processing plants and diagnostic laboratory submissions. Penta-resistance was defined as resistance to Ampicillin, Chloramphenicol, Streptomycin, Sulfamethoxazole, and Tetracycline (ACSSuT). (Note: For a portion of the isolates, the outcome of Streptomycin was observed to be Intermediate, one dilution from the breakpoint). All isolates with the penta-resistant pattern were phage typed at the National Veterinary Services Laboratories.

**Results:** During the years 1997-2000, the percent of DT104 isolates (DT104; including DT104a, DT104b and DT104c) from both *S. Typhimurium* and *S. Typhimurium* var. copenhagen increased from 32.9% in 1997 to 41.9% in 1998, then decreased to 31.8% in 1999 and 23.4% in 2000. A decreasing trend of resistance was observed when the percent was expressed as a percent of total isolates (8%, 7.1%, 6.1% and 5% for 1997-2000, respectively). Regardless of the year, DT104 was more prevalent among *Typhimurium* var. copenhagen isolates than *Typhimurium* isolates. Other phage types were also observed. U302 and an untypable phage type were identified for each year while DT172 was only

identified in 1997 and DT12 was only identified in 1998. DT120 occurred in 1998-2000 and DT103 and DT208 occurred in 1999 and 2000.

**Conclusions:** Typhimurium var. copenhagen isolates have an increased frequency of carrying multiple resistances. Additional phage types appear to vary by year with the exception of DT104 and U302. Further characterization of these isolates will be conducted to characterize the resistance cassette. NARMS is useful in tracking existing and emerging phage types.