NOTE

Antibiotic Resistance of *Erysipelothrix rhusiopathiae* Strains Isolated from Pigs with Acute Septicemic Erysipelas

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(Received 7 June 1984/Accepted 6 August 1984)

ABSTRACT. The susceptibility of 42 isolates of *Erysipelothrix rhusiopathiae* from pigs affected with acute septicemic erysipelas in Japan to antimicrobial agents was determined. A total of 28 (66.7%) strains showed double resistance to oxytetracycline and dihydrostreptomycin. Plasmids were not detected in the resistant strains.—**KEY WORDS:** antibiotic resistance, septicemic erysipelas.

Jpn. J. Vet. Sci. 46(6): 921–923, 1984

Erysipelothrix rhusiopathiae is the causative organism of swine erysipelas which causes a great economic loss in pig production. The clinical signs of swine erysipelas can be generally divided into three types: acute (septicemia), subacute (urticaria), and chronic (arthritis, endocarditis, and lymphadenitis). Antibiotics, especially penicillins have been widely used for the treatment of this disease. Although the susceptibility of *E. rhusiopathiae* had been dealt with *in vitro* by some investigators [1, 2, 5–9], the occurrence of antibiotic-resistant strains except for natural resistance to kanamycin and sulfonamide had not been reported. However, we reported previously [10] that 111 (43.0%) of 258 isolates of *E. rhusiopathiae* from slaughter pigs affected with chronic erysipelas, mainly arthritis or lymphadenitis during a period from 1980 to 1982 in Japan, showed resistance to oxytetracycline or dihydrostreptomycin. Among these resistant strains those of single resistance to oxytetracycline were isolated most frequently, followed by double resistance to oxytetracycline and dihydrostreptomycin. On the other hand, it is unknown whether antibiotic resistance in *E.*

rhusiopathiae strains obtained from the cases of acute septicemic erysipelas occurs or not. The present report describes the antibiotic resistance in *E. rhusiopathiae* strains isolated from pigs affected with septicemia of acute erysipelas in Japan.

A total of 42 strains of *E. rhusiopathiae* belonging to serovar 1a were submitted for the assay of antibiotic susceptibility. They were isolated from the field death cases of acute septicemic erysipelas occurred in Niigata Prefecture (20 strains), Hokkaido (6), Gunma Prefecture (5), Fukuoka Prefecture (4), Okayama Prefecture (4), Saitama Prefecture (2), and Ehime Prefecture (1) from September 1980 to November 1983. The antimicrobial agents studied were: penicillin G (PC-G), ampicillin (APC), erythromycin (EM), oleandomycin (OM), oxytetracycline (OTC), chloramphenicol (CP), dihydrostreptomycin (DSM), kanamycin (KM), and sulfadimethoxine (SDM). The minimal inhibitory concentrations (MICs) were determined by an agar dilution method [3]. A 10^{-2} dilution of an overnight trypticase soy broth culture was inoculated by microplanter (Ebara Works, Tokyo, Japan) onto Mueller-Hinton agar con-

taining serial twofold dilutions of the test antibiotic. The plates were incubated for 48 hr at 37°C. The MIC was defined as the lowest concentration of antimicrobial agent that prevented macroscopic growth.

MICs are shown in Table 1. All of the strains were highly susceptible to PC-G, APC, and EM (MIC, 0.025 to 0.2 U or $\mu\text{g/ml}$), and moderately susceptible to OM and CP (MIC, 0.39 to 1.56 and 1.56 to 12.5 $\mu\text{g/ml}$, respectively). KM and SDM showed no activity against the strains (MIC, >100 and >400 $\mu\text{g/ml}$, respectively). With OTC and DSM, there were two peaks in the distribution of their MICs, indicating that the MIC breakpoint of resistance to OTC and DSM are 6.25 and 50 μg per ml, respectively. It was also found that 28 (66.7%) of 42 strains examined showed double resistance to OTC and DSM. Next, isolation of plasmid DNA was attempted by the method of Kado and Liu [4] except for the use of sodium lauroyl sarcosinate in the procedure of bacteriolysis. However, we could not detect any plasmid in the resistant strains (data not shown).

The present results on susceptibility of *E. rhusiopathiae* strains to PC-G, APC, EM, OM, CP, KM, and SDM are in general agreement with those reported previously by others [1, 2, 5-9], indicating that penicillins remain the antibiotic of choice for the treatment of acute septicemic erysipelas. It should be noted, however, that 66.7% of *E. rhusiopathiae* strains obtained from the cases of acute septicemic erysipelas also showed multiple resistance to OTC and DSM, as shown in the strains from the cases of chronic erysipelas [10]. The outbreak of acute septicemic erysipelas in field recently has shown a steady decrease owing to the wide use of swine erysipelas live vaccine in Japan. Likewise, pigs are usually fed food containing various antibiotics, mainly tetracyclines, for the purpose of growth stimulation. We suggest therefore that the frequent occurrence of such antibiotic-resistant strains is consequent

Table 1. Susceptibility of 42 strains of *E. rhusiopathiae* obtained from the cases of acute septicemic erysipelas to antimicrobial agents

Drug ^{a)}	No. of strains with MIC (μg/ml):														MIC (μg/ml) breakpoint of resistance	No. of resistant strains (%)
	0.025	0.05	0.1	0.2	0.39	0.78	1.56	3.13	6.25	12.5	25	50	100	>100		
PC-G		4 ^{b)}	38 ^{b)}													
APC	4	32	6													
EM		1	9	32												
OM					1	7	34									
OTC				1	2	1	10			5	21	2				
CP							2	1	3	36						
DSM							4	3	2	5				28		
KM														42		
SDM															42	

a) PC-G: penicillin G, APC: ampicillin, EM: erythromycin, OM: oleandomycin, OTC: oxytetracycline, CP: chloramphenicol, DSM: dihydrostreptomycin, KM: kanamycin, SDM: sulfadimethoxine.

b) Units per milliliter.

to selection with drugs rather during long-term habitation of organisms in the swine than soil and manure of swine-raising premises [11].

ACKNOWLEDGEMENTS. The authors wish to express their gratitude to the veterinarians of Niigata Prefectural Chūō Live Stock Hygiene Service Center, Hokkaidō Ishikari Live Stock Hygiene Service Center, Gunma Prefectural Institute of Animal Health, Ehime Prefectural Chūō Live Stock Hygiene Service Center, Saitama Prefectural Ōmia Live Stock Hygiene Service Center, and Animal Disease Diagnostic Laboratory, Okayama Prefectural Government for supplying of *E. rhusiopathiae* strains obtained from the cases of acute septicemic erysipelas.

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要 約

急性敗血症型豚丹毒例から分離された豚丹毒菌の薬剤耐性（短報）：高橋敏雄・沢田拓士・村松昌武・大前憲一・寺門誠致¹⁾（農林水産省動物医薬品検査所，¹⁾農林水産省家畜衛生試験場）——急性敗血症型豚丹毒例から分離された豚丹毒菌42株の薬剤感受性を調べた。28株（66.7%）はオキシテトラサイクリンおよびジヒドロストレプトマイシンに耐性を示した。耐性株からプラスミドは検出されなかった。