DENEOSAMINYLLIVIDOMYCIN B

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In our previous papers,[1~5] the structural elucidation of lividomycins A and B isolated from the fermentation broth of *Streptomyces lividus* nov. sp., and the chemical conversion of lividomycin A into lividomycin B by elimination of the mannose moiety were reported. In the present paper, we report a chemical conversion of lividomycin B into a pseudotrisaccharide by elimination of the neosamine B moiety according to the method reported by HANESSIAN[6]. The pseudotrisaccharide named deneosaminyllividomycin B is weakly bioactive, but useful as a starting material for the synthesis of therapeutically important aminoglycoside antibiotics, such as 3′-deoxyribostamycin and 3′-deoxybutirosin B.

An aqueous solution (50 ml) of penta-N-acetyllividomycin B[5] (**I**, 2.0 g) was treated with sodium periodate (0.8 g) in the dark at room temperature for 20 hours with stirring. After addition of ethylene glycol (0.3 ml), the reaction mixture was evaporated to dryness and the residue (2.8 g) was extracted with methanol (30 ml). The dialdehyde derivative (**II**) in the methanol solution was detected by thin-layer chromatography on Silica gel 60F (E. Merck) using chloroform - methanol (1 : 1 by volume), visualized by triphenyltetrazolium chloride reagent as a single spot with Rf 0.50. Treatment of **II** in the methanol solution with 3 ml of triethylamine at 25°C for 4 hours, followed by evaporation afforded tri-N-acetyldeneosaminyllividomycin B (**III**, 1.12 g, 78%), which was purified by column chromatography (2.0×27.0 cm) on Silica gel C-200 (Wako Chemicals, 40 g) eluted with chloroform - methanol (3 : 2 by volume), mp. 173~176°C (dec.), $[\alpha]_D^{28}$ +49° (*c* 0.5, methanol). Anal. calcd. for $C_{23}H_{39}N_3O_{13}\cdot 1/2H_2O$: C, 48.08; H, 7.02; N, 7.31%. Found: C, 48.06; H, 7.01; N, 7.41%.

A solution of **III** (900 mg) in 4 N sodium hydroxide (22 ml) was heated on a boiling water bath for 5 hours. The reaction mixture was neutralized with 4 N hydrochloric acid, diluted with water (200 ml) and passed through a column (2.0×17.0 cm) of Amberlite IRC-50(NH_4^+) resin. After washing the column with water (300 ml), elution with 0.3 N aqueous ammonia (200 ml) gave a ninhydrin-positive effluent. Rechromatography on a column (2.0×25.0 cm) of CM-Sephadex C-25(NH_4^+) using a gradient elution between water (300 ml) and 0.2 N aqueous ammonia (300 ml) afforded deneosaminyllividomycin B (**IV**) as a white powder (580 mg) in 83% yield. By thin-layer chromatography on Silica gel 60F (E. Merck) using chloroform - methanol - 17% aqueous ammonia (1 : 4 : 3 by volume), **IV** gave a single spot with $R_{\text{lividomycin B}}$ 1.24 after detection with the ninhydrin reagent. By addi-

Scheme 1.

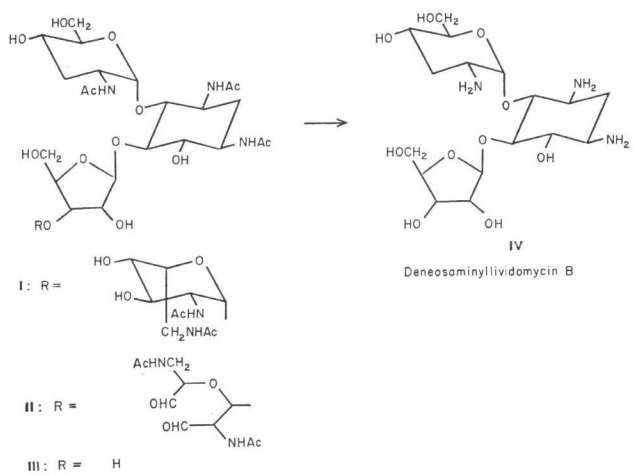
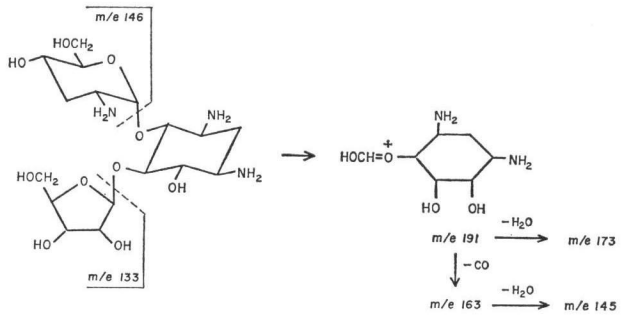


Fig. 1. Significant fragments in mass spectrum of deneosaminyllividomycin B



tion of an equimolar amount of H_2SO_4 to an aqueous solution of **IV** (100 mg), the sulfate was obtained as a white powder (141 mg), mp. 170~174°C (dec.), $[\alpha]_D^{26}$ +30° (*c* 0.8, water). Anal. calcd. for $C_{17}H_{33}N_3O_{10}\cdot 3/2\ H_2SO_4\cdot 2H_2O$: C, 32.80; H, 6.47; N, 6.75; S, 7.72%. Found: C, 32.67; H, 6.10; N, 6.91; S, 8.02%.

After methanolysis of **IV** with 0.4 N hydrogen chloride in methanol at 28°C for 6 days, only 3′-deoxyparomamine and methyl riboside were detected by thin-layer chromatography. The structure of **IV** was further confirmed by the direct electron impact mass spectrum as shown in Fig. 1. Both *m/e* 440 $[(M+1)^+]$ and *m/e* 439 (M^+) peaks were sufficiently abundant for clear assignment of molecular composition. The intensive series of peaks at *m/e* 191, 173, 163 and 145 indicated a 2-deoxystreptamine-containing compound[7]. A very intensive peak at *m/e* 146 was assigned to the 3′-deoxyglucosamine unit, which was produced by normal glycosidic cleavage. On the other hand, the peak of the ribofuranosyl unit (*m/e* 133) was rather weak[7].

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