STUDIES ON NUCLEOSIDE SYNTHESIS. PRODUCT DISTRIBUTION IN THE RIBOSYLATION REACTIONS WITH PURINES AND THEIR ANALOGS IN THE PRESENCE OF STANNIC CHLORIDE

Tokuo Itoh and Yoshihisa Mizuno

Faculty of Pharmaceutical Sciences, Hokkaido University

Kita-ku, Sapporo, Japan

Product distribution has been examined in the ribosylation reactions of adenine (1), N^6-acetyladenine, and 1-deazapurine (2) in the presence of stannic chloride ($SnCl_4$). It was found that reaction parameters (the presence or absence of trimethylsilyl protection, reaction time, and the amount of $SnCl_4$) exerts profound influence on the product distribution. Thus, reaction of (2) with 1,2,3,5-tetra-O-acetyl-D-ribofuranose (3, TAR) catalyzed by $SnCl_4$ in acetonitrile gave rise to 9-(2,3,5-tri-O-acetyl-β-D-ribofuranosyl)-1-deazapurine. In sharp contrast, when trimethylsilyl derivative of (2) was used and the reaction time was limited, 3-(2,3,5-O-acetyl-β-D-ribofuranosyl) derivative was obtained as a major product (60-70%), which rearranged to the 9- and 7-isomers under more vigorous conditions (for the prolonged reaction time and in the presence of excess stannic chloride).

Ribosylation of (1) with TAR (3) in the presence of $SnCl_4$ gave rise to a quantitative yield of 2',3',5'-tri-O-acetyladenosine. With TMS-adenine, a number of products were detected on TLC in earlier stage of the reaction (2 hr.). After 20 hr. period of reaction, the relatively abundant products, 7-β-(25%), 7-α-(18%), 9-β-(20%)-D-ribofuranosyladenines were obtained after column chromatographic separation, followed by deacylation.

It is worthy of note that 7-substituted adenines which are usually quite inaccessible by the usual procedures were isolated as main products. A possible mechanism of the ribosylation reaction involving ribosylation at N(3) followed by rearrangement of the ribosyl residue to N(7) or N(9), and application to the preparation of 7-glycosyladenines of biological interest will be discussed.