

Structural Analysis of β -D-(1 \rightarrow 3, 1 \rightarrow 6)-glucans

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β -D-(1 \rightarrow 3, 1 \rightarrow 6)-glucans have the ability of enhancing and stimulating the immune system of humans, and are thus called as biological response modifiers (BRMs). β -glucans generally have a β -D-(1 \rightarrow 3)-linked anhydrous glucose units (AGUs) in the backbone and periodic β -D-(1 \rightarrow 6)-linked side chains. The molecular structure of a series of β -D-(1 \rightarrow 3, 1 \rightarrow 6)-glucans including degree of polymerization (DP), degree of branching (DB), and the complete assignment of all H-1s at different AGUs have been analyzed by ¹H-NMR spectroscopy in a mixed solvent (*d*6-DMSO:D₂O=6:1) at 80°C. We have developed a simple and non-destructive method for the determination of the DP and DB of β -D-(1 \rightarrow 3, 1 \rightarrow 6)-glucans up to the molecular size of curdlan (DP = 540) by using ¹H NMR spectroscopies. Our NMR analysis revealed that DP of yeast glucan was 218 showing a good agreement with the result analyzed by MALLS. DB was measured to be 0.003 and α : β ratio, 1:1. The obtained α : β ratio and DB as small as 0.003, which had not been possible to measure by other methods, proved the powerfulness of the ¹H NMR analysis. The DP and DB of pachyman were calculated to be 540 and 0.003, respectively. The DP value of pachyman as high as 540 is the largest one obtained by NMR analysis, reported so far, and the DBs of curdlan and pachyman are the first measurements by NMR analysis.