

## GLUCAN DENDRIMER FOR CARBOHYDRATE DRUGS

Takashi Kuriki, Chief Scientific Officer, Ezaki Glico Co., Ltd.  
kuriki-takashi@glico.co.jp  
Ryo Kakutani, Institute of Health Sciences, Ezaki Glico Co., Ltd.  
Michiyo Yanase, Institute of Health Sciences, Ezaki Glico Co., Ltd.  
Akiko Kubo, Institute of Health Sciences, Ezaki Glico Co., Ltd.  
Saori Hokari, Institute of Health Sciences, Ezaki Glico Co., Ltd.  
Takashi Takaha, Institute of Health Sciences, Ezaki Glico Co., Ltd.

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Dendrimers are highly branched and star-shaped polymers with nanometer-scale dimensions. The nanostructured macromolecules are known for their defined structures, versatility in drug delivery, and high functional properties similar to biomolecules.

We developed a new way to synthesize glucan dendrimer like glycogen by using branching enzyme (EC 2.4.1.18) and glucan phosphorylase (EC 2.4.1.1) by using glucose-1-phosphate as a substrate. This way enables us to produce glucan dendrimers with strictly controlled molecular size and branching structure. In this context, we developed specific glycosylation technology to substitute glucose residues at non-reducing ends with galactose, mannose, glucosamine, glucuronic acid, or *N*-acetylglucosamine residues. Glucose dendrimers having glucosamine and/or glucuronic acid residues are successfully used for conjugation of other functional molecules. The nano-particle conjugated glucan dendrimers with peptide antigen and nucleotide adjuvant is a potential platform for vaccine.

We investigated the glucan dendrimers function as a drug carrier. The uptake of several glucose dendrimers into antigen-presenting cells (APCs), such as dendritic cell and macrophage, were examined. Glucose dendrimers were incorporated into APCs, and introducing various sugar moieties into glucan dendrimers enhance the uptake them by APCs. When glucan dendrimer-peptide conjugates were added to the cultured APCs, the peptides were effectively presented on the surface of APCs. FITC-labeled glucan dendrimers injected subcutaneously in mice accumulated into inguinal lymph nodes, which play important role to introduce acquired immune response