

# HATANAKA LAB.

## [Glyco-Biotechnology]

Department of Materials and Environmental Science

<http://www.chembio.t.u-tokyo.ac.jp/labs/hatanaka.html>

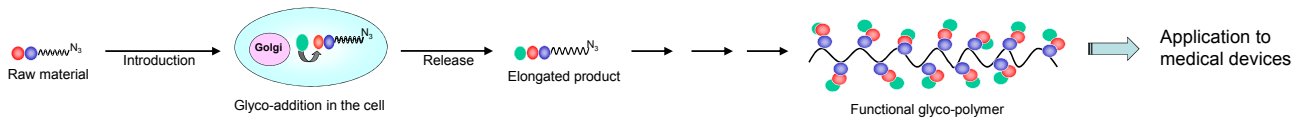
Biomaterial Engineering

Department of Chemistry and Biotechnology

### 3rd Biomacromolecules

**【To make saccharide chains and glyco-polymers】**

- ★ Production of oligosaccharide by using mammalian cells



- ★ Introduction of amphiphilic polymers to mammalian cells

Poly(HMA(C<sub>6</sub>)-co-MPC) mainly localized in ER.

Amphiphilic polymer synthesis: CH2=C(R)CO + CH2=C(R')CO + H2N-CH2-CH2-NH2 + APS in DMSO, H2O yields an amphiphilic polymer.

Cellular localization: 3 h incubation of cells with the polymer. Fluorescence microscopy shows localization in the ER (ER specific marker, red) and the polymer (green). The merge image shows co-localization (yellow/green). Scale bar: 40 μm.

Application to DDS (drug delivery system)

**【To know the functions of saccharide chains】**

- ★ Synthesis of glycolipid dimer analog and its inhibitory effect on epidermal growth factor-induced receptor tyrosine kinase

Development of new antitumor agent

Diagram showing the inhibition of EGFR signaling. The GM3 mimetic dimer (a glycolipid dimer) binds to the EGFR receptor, preventing its activation and subsequent phosphorylation (P). This leads to the inhibition of cell proliferation, angiogenesis, invasion/metastasis, and apoptosis.

Chemical structure of GM3 mimetic dimer is shown.

GM3 mimetic dimer inhibited cancer cell growth				
	FBS	G <sub>0</sub> /G <sub>1</sub> (%)	S (%)	G <sub>2</sub> /M (%)
Control (EGF negative)	-	85.9	5.1	9.0
Control (EGF positive)	+	71.5	13.3	15.2
GM3	+	76.0	8.7	15.3
m-dimer	+	83.4	6.8	9.8

**【To use saccharide chains and biomass】**

- ★ Development of Vero-toxin removal apparatus

Immobilization on hollow fibers

Medical device for removal of Vero-toxin from the blood

Graph showing cell number vs. diluted concentration for various toxins. Most of the toxin was removed.

- ★ Immobilization of oligosaccharides by using fluoros interaction

Saccharide production

Immobilization on fluoros material (C<sub>6</sub>F<sub>17</sub>)

Spotting on the fluoros modified glass slide

50 μM primer solution (solvent : methanol)

Drying under reduced pressure

Detection of viruses Adsorption of viruses

- ★ Synthesis of bio-based plastic

