# Synthesis of small molecules of chondroitin sulfate E and their biological studies on neurite outgrowth

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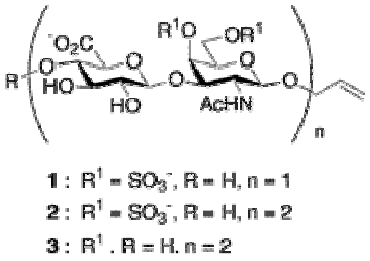
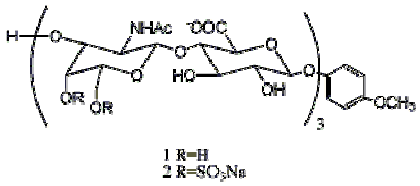
**Abstract:**

Chondroitin sulfate glycosaminoglycans are sulfated, linear, heterogeneous polysaccharides implicated in cell division, brain development and neuronal development and regeneration.[1] The complexity and heterogeneity of chondroitin sulfate (CS) makes the elucidation of their structure difficult and the precise structural basis for many of their important biological activities is still not well understood.

For instance, CS has been shown to promote neurite outgrowth of hippocampal neurons; yet it is also found that enzymatic removal of CS chains from CS proteoglycans enhances axonal regeneration after spinal cord injury. [2, 3] Notably, the molecules used in those studies were ~200 saccharides in length, poorly defined, and heterogeneously sulfated, and these features might account for the controversial observations. Among the sulfation patterns implicated in the modulation of cell growth is the disulfated CS-E motif (Fig.). [4]




GlcA(1-3)GalNAc




GalNAc(1-4)GlcA

Synthetic access to CS-E molecules of defined length and sulfation pattern, combined with biological studies, should enable a systematic examination of structure-activity relationships. The present talk describes the synthesis of CS-E di-, tetrasaccharides of GlcA(1-3)GalNAc type and hexasaccharides of GalNAc(1-4)GlcA type, and analyzes the results of biological investigations of synthetic CS molecules in neuronal outgrowth. [4, 5]

Based on the ability of CS small molecules to recapitulate the activity of larger polysaccharides[4], current investigations and future studies on other sulfation patterns and the targets of CS-E in vivo should faster progress to understand and manipulate neuronal growth and regeneration.

**References:**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