

GlycoPol™ - Novel Glycopolymers for Therapeutic Targeting

GlycoPol™ is a novel glycopolymer technology based on polymers containing a diverse array of carbohydrates that offers the potential to target biological therapeutics, including proteins, peptides, oligonucleotides and nanoparticles, to carbohydrate receptors on specific cells and tissues.

GlycoPol™ polymers comprise pendant sugars covalently attached to a poly(methacrylic acid) backbone using click chemistry. GlycoPols™ can be structurally tuned for a particular target by variation of the sugar structure, conformation and content. Mono-, di- and polysaccharides, and mixtures of these, can all be used for the synthesis of a range of glycopolymers with polymer chain lengths from 6 to 100 units each clicked to a sugar.

Tissue microarray studies with normal and inflamed human tissues demonstrate specific and selective binding of GlycoPols™ depending on the sugar composition and chain length of the glycopolymer. GlycoPol™ polymers are designed for site-specific conjugation via thiols or amines to biological and other therapeutic entities, thereby offering the potential for tissue targeting for optimal therapeutic effect.

GlycoPol™: Background

Carbohydrates are information-rich molecules involved in a number of important biological processes including cell-cell recognition, cell-protein interactions and the targeting of hormones, antibodies and toxins. The pharmacokinetics, pharmacodistribution, solubility, stability and receptor binding of biomolecules are all influenced by their carbohydrate composition.

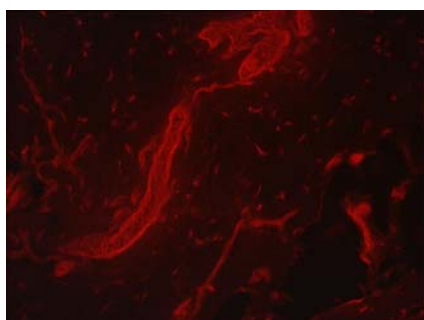
The rationale behind GlycoPol™ is that it offers a novel approach to engineering the carbohydrate content of a biomolecule or to introducing carbohydrate on to molecules that are unglycosylated. Depending on the carbohydrate composition of the attached glycopolymer, this presents the opportunity not only to target the biomolecule to a specific tissue but also to enhance the biological activity of a particular biomolecule.

Human Tissue Binding Studies

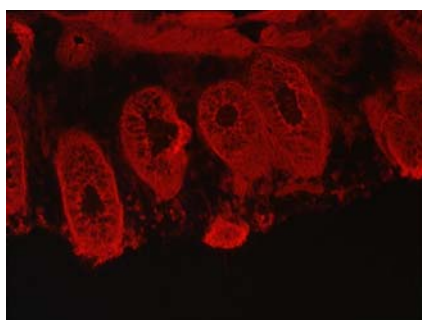
A number of GlycoPols™, comprising chain lengths of between 6 and 100 units and several different mono- and di-saccharides, have been evaluated for binding to twenty-five normal and inflamed human tissues. The GlycoPols™ show specific and selective binding, together with various degrees of tissue specificity, indicating these novel polymers can be used to target 'cargos' to tissues.

Binding of biotin-labelled GlycoPols™ to normal human breast, colon and prostate tissues

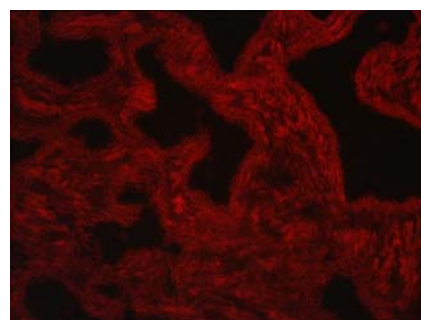
Breast



Colon



Prostate



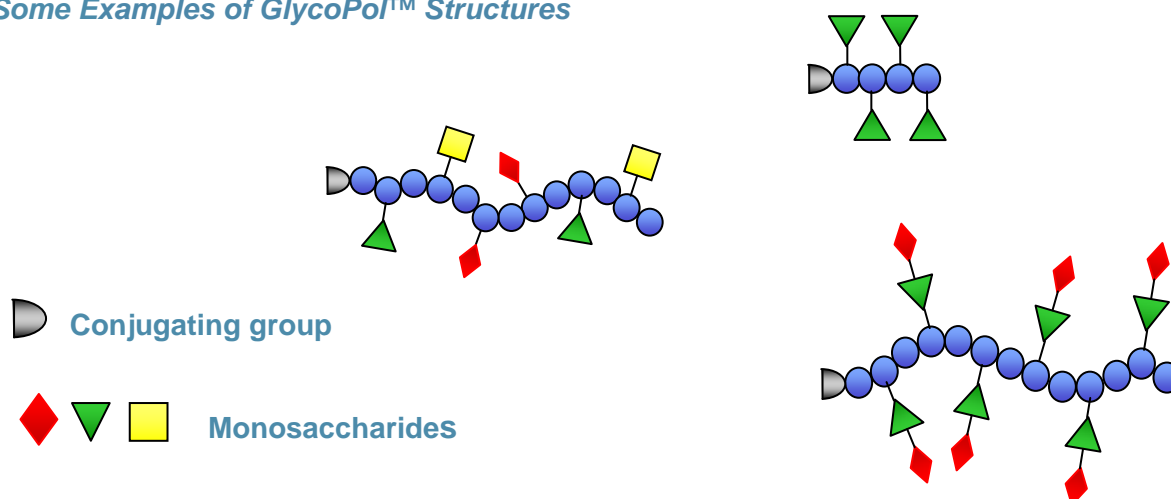
Design Versatility

GlycoPol™ glycopolymers are easily prepared. Firstly, a polymer backbone is synthesised by living radical polymerisation (LRP), which allows tight control over the chain length and architecture of polymers in addition to the incorporation of conjugation functionality at the initiator. Secondly, the desired sugar molecules are “clicked” on to the backbone to produce the glycopolymer.

A large variety of carbohydrate-based materials can be obtained starting from the same “clickable” polymer. This allows libraries of glycopolymers featuring materials with polymer backbones of identical size, but differing only in the nature of the pendant sugar moieties, to be readily prepared.

Each glycopolymer has a single reactive conjugating end group for site-specific covalent attachment to biomolecules. Depending on the conjugation chemistry chosen, glycopolymers can be attached via free thiols or via amines to a wide range of therapeutic entities, including proteins, peptides, oligonucleotides and nanoparticulate vehicles.

Some Examples of GlycoPol™ Structures



Intellectual Property

GlycoPol™ is protected by a series of granted patents and patent applications. The patent coverage includes the glycopolymers and the processes to produce them as well as GlycoPol™-biomolecule conjugates.

Commercial Strategy

WEP's business strategy is to establish collaborations and partnerships with pharmaceutical and biotechnology companies wishing to develop novel GlycoPol™ versions of therapeutic cargos to enhance their therapeutic effect. A typical collaboration starts with WEP working with its collaborators to define and produce the optimal GlycoPol™ for the purpose.

The Company's objective is to license-out GlycoPol™ for specific target molecules and/or applications on either an exclusive or non-exclusive basis and to manufacture the relevant GlycoPols™ for its partners.