Carbohydrate-based Drug Design

Schedule:

Week 1: Classification and stereochemical properties of carbohydrates, depictions, basics of carbohydrate nomenclature.

Week 2: Chemical properties and transformations of free sugars.

Week 3: Reactivity of the hydroxyl groups, basics of protecting group chemistry in carbohydrates.

Week 4: Reactivity of the anomeric centre.

Week 5: Transformations on non-anomeric carbons.

Week 6: Glycosylation reactions: activation of the anomeric centre, formation of the glycosidic bond, stereochemical effects of donor and acceptor.

Week 7: Oligosaccharide synthesis: general considerations; glycosylation strategies; methods and techniques; industrial implementation; human milk oligosaccharides (HMOs).

Week 8: Cyclodextrins as special carbohydrates: enzymatic preparation, ring formation, structural and inclusion properties, pharmaceutical applications.

Week 9: Carbohydrates among classical medicines; biological roles of carbohydrates and their conjugates; carbohydrate–protein interactions; glycoenzymes, lectins; multivalency; carbohydrates and glycomimetics in drug design.

Week 10: Antiviral neuraminidase inhibitors; influenza neuraminidase mechanism; zanamivir and oseltamivir; nucleoside analogues against coronaviruses.

Week 11: Antidiabetic α-glucosidase inhibitors; carba-, aza/imino- and thiosugars; iminosugars in clinical use; glycogen phosphorylase inhibitors; SGLT2 inhibitors, mechanism, representatives and synthesis.

Week 12: Carbohydrate-based anticoagulants: heparin, structural heterogeneity, protein interactions, synthetic heparin analogues.

Week 13: Polysaccharide-conjugate vaccines; lectin antagonists; carbohydrate-based molecular imaging and microarray diagnostics.