Glucuronidation process

Glucuronidation *(drug metabolism https://en.wikipedia.org/wiki/Glucuronidation)* represents a major pathway which enhances the elimination of many lipophilic xenobiotics and endobiotics *(drugs and chemicals produced outside and inside the body)* to more water-soluble compounds. The UDP-glucuronosyltransferase (UGT) *(enzyme from gene UGT)* family catalyzes the glucuronidation of the glycosyl group *(A glycosyl group is a group obtained by removing the hydroxy group from the hemiacetal function of a monosaccharide and, by extension, of a lower oligosaccharide.)* of a nucleotide sugar *(activated monosaccharide https://en.wikipedia.org/wiki/Nucleotide_sugar)* to an acceptor compound (aglycone) at a nucleophilic functional group *(https://chem.libretexts.org/Courses/University_of_Illinois_Springfield/UIS%3A_CHE_267_-_Organic_Chemistry_I_(Morsch)/Chapters/Chapter_07%3A_Alkyl_Halides_and_Nucleophilic_Substitution/7.08%3A_The_Nucleophile Nucleophilic functional groups are those which have electron-rich atoms able to donate a pair of electrons to form a new covalent bond)* of oxygen (eg, hydroxyl or carboxylic acid groups), nitrogen (eg, amines), sulfur (eg, thiols), and carbon, with the formation of a beta-D-glucuronide product. https://pubmed.ncbi.nlm.nih.gov/11465080/

Enzymes of the human uridine diphosphate (UDP)-glycosyltransferase (UGT) superfamily typically catalyze the covalent addition of a sugar from UDP-sugar cofactors to relatively small lipophilic compounds. The sugar conjugates are often biologically less active with improved water-solubility, facilitating more effective elimination from the body. Experimental data indicate that UGT proteins exhibit differing selectivities toward various UDP-sugars.https://pubmed.ncbi.nlm.nih.gov/26289097/

UDP glycosyltransferases (UGT) are a superfamily of enzymes that catalyses the addition of the glycosyl group from a UDP-sugar to a small hydrophobic molecule. http://www.ebi.ac.uk/interpro/entry/InterPro/IPR002213/

The substances resulting from glucuronidation are known as glucuronides (or glucuronosides) and are typically much more water-soluble than the non-glucuronic acid-containing substances from which they were originally synthesised. The human body uses glucuronidation to make a large variety of substances more water-soluble, and, in this way, allow for their subsequent elimination from the body through urine or feces (via bile from the liver). Hormones are glucuronidated to allow for easier transport around the body. Pharmacologists have linked drugs to glucuronic acid to allow for more effective delivery of a broad range of potential therapeutics. Sometimes toxic substances are also less toxic after glucuronidation.

The conjugation of xenobiotic molecules with hydrophilic molecular species such as glucuronic acid is known as phase II metabolism.

https://en.wikipedia.org/wiki/Glucuronidation

Glucuronidation is a major pathway of xenobiotic biotransformation in most mammalian species, and requires the cofactor uridine diphosphate-glucuronic acid.[68,117] The reaction is metabolized by UGTs (also called glucuronyltransferases), which are present in many tissues.[68,117] The site of glucuronidation is generally an electron-rich nucleophilic heteroatom (oxygen, nitrogen, or sulfur).[68] Human UGTs are a family of enzymes that detoxify many hundreds of compounds by their conjugation to glucuronic acid, rendering them harmless, more water-soluble, and, hence, excretable.

The cosubstrate for bilirubin conjugation is UDP-glucuronic acid. UDP-GlucA is a ubiquitous intracellular substance derived from glucose. It conjugates with various endogenous and exogenous substances, including drugs, to form a group of compounds collectively termed glucoronides. Conjugation of a compound with glucuronic acid produces an acidic, more watersoluble molecule with different metabolic, transport and excretion properties. The availability of UDP-GlucA may decrease following enhanced glucuronidation requirements (e.g., high substrate load) or due to glycogen depletion (e.g., fasting).
https://www.ima.org.il/filesupload/imaj/0/60/30162.pdf

Glycogen https://my.clevelandclinic.org/health/articles/23509-glycogen
Glycogen is glucose, stored in your liver for when you need it later.