Small molecule therapeutic treats glycogen storage disease independent of patient-specific enzyme deficiencies

Technology #cu16051

Glycogen storage diseases (GSD) are a family of diseases that result from abnormal glycogen metabolism, leading to unhealthy glycogen accumulation in the body that can cause growth defects, organ failure, and even death. Current treatments mainly target replacing deficient enzymes using gene therapy, which carries expensive and labor-intensive development. Additionally, as enzyme deficiencies vary by patient, treatment by gene therapy is not generalizable and must be tailored to each GSD subtype. This technology treats GSD by targeting the production of glycogen itself, upstream of respective deficiencies in glycogen metabolism. As such, this technology uses guaiacol, a conventional small molecule therapeutic, to treat GSD irrespective of patient-specific enzyme deficiencies.

Guaiacol is a cost-effective strategy for reducing glycogen production and accumulation

GSD are caused by mutations in the enzymes responsible for glycogen metabolism, thereby preventing normal glycogen processing. Current approaches seek to restore or replace the patient-specific enzyme using methods such as gene therapy. However, as many enzymes contribute to glycogen metabolism, therapies must be developed for each deficient enzyme. In an effort to treat GSD regardless of the enzyme deficiency, this technology instead targets glycogen production itself. Using a mouse embryo fibroblast (MEF) cell line that was engineered to accumulate glycogen to simulate GSD, this technology identified a compound called guaiacol that decreases glycogen synthesis and accumulation by 50%. This technology demonstrated that guaiacol reduces glycogen by inhibiting glycogen synthase. As such, unlike labor- and cost-intensive gene therapy, this technology treats GSD irrespective of the specific enzyme deficiency with a simple small molecule therapeutic.

Guaiacol has been demonstrated to cause a significant decrease in glycogen content in the liver in a mouse model of GSD.
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Applications:
• Treatment and prevention of Glycogen Storage Diseases (GSD), including Adult Polyglucosan Body Disease and Lafora Disease

Advantages:
• Guaiacol is readily available and easy to produce
• Guaiacol targets glycogen production to treat GSD regardless of the specific deficiency in glycogen metabolism

Patent Information:
Patent Pending
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Related Publications:

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