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Commentary

Synthetic Zeolite Therapy for Individuals Suffering from Diabetes

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DESCRIPTION

High blood glucose levels caused by inadequate insulin synthesis or impaired insulin action characterize diabetes, a chronic metabolic illness that affects millions of individuals worldwide. Diabetes can lead to serious complications such as cardiovascular diseases, kidney failure, nerve damage, and blindness. Therefore, finding effective ways to prevent and treat diabetes is a major challenge for the medical community. One of the potential candidates for the therapy of diabetes is synthetic zeolite, a type of porous crystalline material that has unique physical and chemical properties. Zeolites are widely used in industrial applications, such as catalysis, adsorption, separation, and ion exchange. They are also known to have beneficial effects on health, such as detoxification, antioxidant, anti-inflammatory, and immunomodulatory activities. Synthetic zeolite is a man-made version of natural zeolite, which is a mineral that occurs in volcanic rocks. Synthetic zeolite can be designed to have specific pore sizes, shapes, and compositions, which can enhance its performance and functionality. Synthetic zeolite can also be modified with various metals or organic molecules to create novel materials with diverse applications.

Numerous studies have demonstrated the beneficial effects of synthetic zeolite on diabetic individuals. The effects of particular zeolite-clinoptilolite supplementation on selected blood parameters of patients suffer with osteoporosis, Crohn's disease and diabetes. According to the findings, zeolite-clinoptilolite treatment dramatically lowered blood glucose levels in diabetic patients and enhanced their lipid profiles. Additionally, supplementing with zeolite-clinoptilolite raised blood levels of insulin and other hormones that control glucose metabolism. The impact of synthetic zeolite supplementation on rats with diabetes brought on by streptozotocin. The findings demonstrated that adding synthetic zeolite to diabetic rats' diets considerably lowered their blood glucose levels and raised their insulin levels. Additionally, supplementing with synthetic zeolite enhanced the liver and kidney functions, decreased DNA damage and oxidative stress, and controlled the immunological response in diabetic rats. The mechanisms by which synthetic zeolite exerts its anti-diabetic effects are not fully understood, but some possible explanations have been proposed. One of them is that synthetic zeolite can act as an adsorbent that binds to glucose and other toxins in the blood and removes them from the body. Another possibility is that synthetic zeolite can act as an antioxidant that scavenges free radicals and protects the cells from oxidative damage. On the other hand, the STZ+SZ group had higher insulin levels, higher antioxidant levels (glutathione, superoxide dismutase, and catalase), and higher total antioxidant capacity in the blood. A third possibility is that synthetic zeolite can act as an immune-modulator that regulates the inflammatory and immune responses that are involved in diabetes. Synthetic zeolite is also being explored as a potential material for the development of artificial pancreas, a device that can mimic the function of the natural pancreas and regulate the blood glucose levels of diabetic patients. The capability of encasing the pancreatic islet cells, which are in charge of manufacturing insulin and other hormones, in a framework made of synthetic zeolite has been established. The synthetic zeolite scaffold provided a biocompatible and porous environment for the islet cells, which maintained their viability and functionality. The synthetic zeolite scaffold also protected the islet cells from immune rejection and inflammation, which are common challenges in transplantation therapy.

CONCLUSION

Synthetic zeolite is a promising material that can be used as a supplement for the therapy of diabetes. It has been proven to have beneficial effects on the blood glucose levels, insulin levels, lipid profile, kidney and liver functions, oxidative stress, DNA damage, and immune response of diabetic patients. However, more studies are needed to confirm its safety and efficacy in humans and to elucidate its molecular mechanisms of action. However, more research is needed to optimize the synthesis, modification, characterization, and evaluation of synthetic zeolite for diabetes applications. The study showed that the synthetic zeolite-encapsulated islet cells could effectively lower the blood glucose levels of diabetic mice after implantation.

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