

Structural analysis of hexameric lyspro insulin analog

ABFR

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INTRODUCTION

Gestational diabetes is diagnosed for the first time during pregnancy that is gestation like other types of diabetes. It affects how your cells use sugar. It causes high blood sugar that can affect pregnancy and baby's health too. The initial management for gestational diabetes includes intensive lifestyle modification, which often requires behavioural and nutritional changes to optimize glycemic control. A blood sugar level of 190 mg/dL which indicates gestational diabetes, the blood sugar level of below 140 mg/dL is considered as normal on glucose challenge test. This gestational diabetes affects up to 10% of women who are pregnant in the United States per year. There were an estimated 223 million women of 20-79 years living in diabetes, this is projected to increase to 343 million by 2045. 20 million or 16% of live births had some form of hyperglycaemia in pregnancy. An estimated 84% were due to gestational diabetes. There are many research programmes done on gestational diabetes some of them dealing with increased risk of cardiovascular disease in young women following gestational diabetes mellitus. While the gestational diabetes mellitus increases the risk of cardiovascular disease in women with family history of type 2 diabetes. This may be a permanent or temporary disease depending upon the immune system of the women. There are oral pills as medication but there is no permanent specific medication for this disease. This disease generally involves the hormone insulin, because of the imbalances and mutations in this protein the pregnancy women get affected by this. The mutations and other causes the women to suffer from this disease. Insulin is the traditional first choice drug for blood sugar control during pregnancy because it is the most effective for fine-tuning blood sugar and it does not cross the placenta. In randomized trials comparing maternal and infant outcomes, metformin has been shown to be an effective alternative to insulin, which is the historical standard treatment for gestational diabetes mellitus. The rapid acting bolus analogues aspart and lispro achieve postprandial targets with less hypoglycemia compared to regular insulin, with similar fetal outcomes. The long acting insulin analogues glargine and detemir appear safe with similar fetal outcome. Insulin and alternate of metformin are with the best medication purposes for women with GDM.

EXPERIMENTALS

PDB ID 6NWV is downloaded from Protein Data Bank. Following to this the quality of the structure has been determined with two tests as in the first step the resolution of the structure is lesser than R-work and in the second step the difference between R-work and R-free is equal to 0.05. In this structure there are two macro molecules with two entity IDs namely Insulin A chain and Insulin lispro B chain. Even there are four small molecules namely CRS, GOL, ZN, CL. As the structure is with many chains so as to make it simplify for better study the two main sequences are selected which are in the green colour and cyan colour. As the magenta colour chain and the green colour chain are with same sequences and similarly yellow colour chain and cyan colour chains are with the same sequences. As the sequences are same we can select the green colour chain and cyan colour chain and can remove the other sequences. After that by selecting on the chain we can able to get the alpha helices and beta strands of the protein structure. Then, the hydrogen bonds of the structure are determined. Completely this work is done with the help of PyMOL.

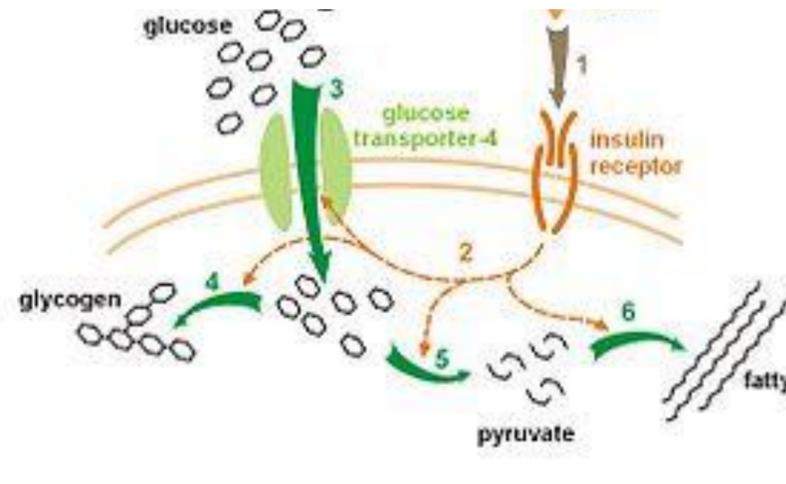


figure 1 the cycle of diabetes



woman with gestational diabetes

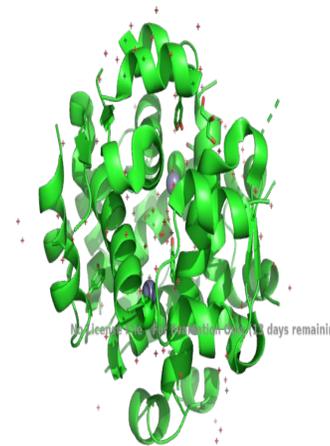


figure 3 lyspro insulin analog

RESULTS & DISCUSSION

From the structure the result oriented is that the protein structure is not much better quality from from first test of determination with value of 16%, but from the second test the structure is of better quality one with 0.05 value. Following to that, there are one alpha helix and one beta strand. This protein is purely hydrophobic, as there are no hydrogen bonds, while one of the small molecule ZN is forming a coordination bond with histadene and the other small molecule CRS is also hydrophobic with no hydrogen bonds. This structure is not containing any type of hydrogen bonds hence it is hydrophobic in nature. As we decreased the sequence bands in result of that we got 1 alpha helix and 1 beta strand.

REFERENCES

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