The Role of Transcription Factor Pax6 in Maintenance of Pancreatic Beta Cell Identity

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Purpose of the Experiment Diabetes mellitus (DM) is a widespread metabolic disease, caused by lack of Insulin producing beta cells, or body cells Insulin resistance. Transcription factor Pax6 is known for participating in beta cell differentiation during embryonic development but its function in mature beta cells remains unclear. To determine the role of Pax6 in maintaining beta cell identity, we study changes in beta cells that lose Pax6 only after they fully differentiated. Procedures Used Using inducible Cre-lox system: we produced adult Pax6 knockout mice and use genetic lineage tracing by marking Pax6 knockout beta cells with GFP. Immune-staining was used to characterize Pax6 knockout beta cell. Observation/Data/Results Results show physiological changes, including decrease in Insulin synthesis and secretion, in Pax6 knockout beta cells, and appearance of Diabetic symptoms. We also detected variation in expression of proteins related specifically to beta cell. Interestingly, beta cells population lacking Pax6 undergo a process of transdifferentiation, indicated by loss of insulin and appearance of Ghrelin hormone in GFP marked cells. Conclusions/Applications: From this research, I conclude that Pax6 is necessary for beta cell identity not only during embryonic development, but also throughout the cells whole lifetime. Understanding the function of Pax6 in mature beta cells contributes to Diabetes research approach of producing functioning beta cells from stem cells. We hope to get more data about former beta cells now ghrelin producing cells and discover an even more detailed image of beta cell identity. Further transcriptional analysis of Pax6 deleted beta cells, will explain the mechanism by which Pax6 maintains beta cell identity

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