



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Determining whether the PTPN2 gene plays a role in the development of Type 1 Diabetes

Finalist's Name: Amy Xia

School and City: Cherry Creek High School, Greenwood Village

Sponsor's Name: Jeffrey Boyce

Category: Biomedical Sciences (BMED)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

Type 1 diabetes (T1D) is an autoimmune disease that leads to destruction of insulin producing β -cells. The protein tyrosine phosphatase non-receptor type2 (PTPN2) gene plays an important role in the disease and mutations are often associated with increased risk of T1D development. However, it is unclear the role of PTPN2 in regulating antibody producing B-cells and its subsequent effect on immune regulation that leads to β -cell destruction. In this study, we explore whether and how the deletion of the PTPN2 gene affects total IgG and IgG isotype antibody production in B-cells using enzyme linked immunosorbent assay (ELISA). Our experiments using the PTPN2 knockout/deletion (PTPN2-KO) in mice B-cells showed, on average, 48.332% increase in total IgG antibodies than in control wild-type(WT) mice, with normal PTPN2 expression. A similar trend was observed in IgG isotypes: IgG1, IgG2a, IgG2b had a 30.17%, 11.459% and 16.23% increase respectively. Despite the trend of increase in most IgG isotypes, there wasn't significant change in IgG3 antibodies in PTPN2-KO mice compared to WTs. The increase in total IgG antibodies was proven statistically significant. These results suggest that PTPN2 in B-cells plays an important role in regulating total IgG antibody production.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature:

Date:

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with your Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.