



**CALIFORNIA STATE SCIENCE FAIR
2012 PROJECT SUMMARY**

Name(s) Tanvi K. Gambhir	Project Number S0616
Project Title Reappraisal of Chromium from Stainless Steel as the Cause of the Diabetic Epidemic around the World	
Abstract Objectives/Goals This project has three objectives: To determine if chromium from stainless steel containers is capable of chelating when an acidic substance is stored in it; to see whether there is a relationship between the sample storage duration and the pH of the substance and the amount of chromium chelation; to prove whether storing acidic substances in stainless steel containers may be a source of the excess chromium we are exposed to, which may have biological consequences. Methods/Materials Buttermilk was made from scratch and stored in a stainless steel container and a ceramic container (the control). Samples were taken after 0, 1, 4, 8, 12, and 24 hours. The pH of the buttermilk was taken during the sample extraction. These samples were first acid digested then analyzed for chromium content using an IPC Emission Spectrometry. The experiment was conducted twice; the pH of each sample and the sample after 8 hours were only taken during the second experiment, however everything else remained the same. Results For the first trial, the chromium levels for all the samples taken from the ceramic container were below the detection level of 0.005 mg/L. Of the samples taken from the stainless steel container, only two samples, taken after 1 and 4 hours, were below detection level. The amount of chromium chelation increased to 0.005 mg/l between 4 and 12 hours and to 0.0075 mg/L between 12 to 24 hours. The results for the second trial are still pending. Conclusions/Discussion From the first trial it was proven that chromium from stainless steel containers can be chelated in the presence of an acidic substance and that there is a positive correlation between sample storage duration and amount of chromium chelation. This data suggests that storing acidic substances in stainless steel containers is a possible source of excess chromium exposure. This is significant because studies suggest that high chromium exposure during preconception and fetal stage leads to the increased prevalence and development of type 2 diabetes and other biological consequences in the offspring	
Summary Statement My project determines whether chromium from stainless steel utensils can be chelated under the presence of an acidic substance and observes the relationship between the storage duration, pH value and the amount of chromium chelation.	
Help Received I discussed this project with Dr. Prakash Gambhir, a pediatrician and geneticist in India ; Dr. Mona Othman from the USDA of Salinas contacted the UC Davis lab and provided the equipment to prepare my samples; the samples were analyzed at the UC Davis chemistry laboratory; Parents gave me moral	