



**CALIFORNIA STATE SCIENCE FAIR  
2016 PROJECT SUMMARY**

<b>Name(s)</b> <b>Logan A. Dalton</b>	<b>Project Number</b>  <div style="text-align: right;">36110</div>
<b>Project Title</b> <b>Design and Evaluation of an EZ Tie Emergency Temporary Vascular Shunt</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The objective of this experiment was to evaluate the (test device) EZ TIE EMERGENCY TEMPORARY VASCULAR SHUNT. The time and feasibility, was compared to the (control device) Improvised Vascular Shunt with Silk Ties referred to in the South African Journal of Surgery. The device is designed to be used by lay people, and be included in First Aid medical kits that contain tourniquets. It functions to extend the time needed to present the patient to a vascular surgeon for permanent repair limiting complications potentially saving lives and limbs.</p> <p><b>Methods/Materials</b> Generated on a 3D printer, the shunt clip incorporates the use of micro zip ties and catheter tubing. The brachial artery and vein were modeled with a loop of surgical tubing embedded in a silicon arm. A pump and reservoir circulated green water through the severed brachial artery analog. A tourniquet was employed and repairs with both devices were made by a group of 20 participants representing the general population. The tourniquet was released to test the repairs. The ease of use of each device was measured by timed trials for comparison. Heart rates of each participant were recorded before and after each trial to monitor stress. There were 40 trials for each device (2 for each participant) for 80 total trials.</p> <p><b>Results</b> The EZ TIE was an average of 36.92 seconds faster than the control. The control device, Improvised Vascular Shunt with Silk Ties increased heart rates an average of 2.65 beats per minute more per trial than the test device. No failures were observed when the tourniquets were released.</p> <p><b>Conclusions/Discussion</b> This experimentation with the EZ TIE EMERGENCY VASCULAR SHUNT with Micro Zip Ties supported my hypothesis, it was quicker to employ than the Improvised Vascular Shunt with Silk Ties.</p>	
<b>Summary Statement</b> This project showed that the EZ TIE EMERGENCY TEMPORARY VASCULAR SHUNT Design, utilizing a shunt clip, micro zip ties and catheter tubing was easier and quicker to employ than the Improvised Temporary Vascular Shunt With Silk Ties	
<b>Help Received</b> KNB EFX Group, loaned me a silicone arm. Calvin Loesser, my neighbor, helped me print my drawing of the shunt clip on his 3D printer. My parents, Drew and Patricia, supervised with trials and subjects, and also encouraged me. Mrs. Shah, my advisor, Mr. Okimura, my science teacher advised me.	