



**CALIFORNIA STATE SCIENCE FAIR
2013 PROJECT SUMMARY**

Name(s) Nykolas Maxey	Project Number J1799
Project Title The Effects of Metformin on the Caudal and Cephalic Regeneration of Planaria	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals In this experiment, I studied the potential use of less expensive planaria to examine the effects of the drug metformin on the speed of (neurogenesis) tissue regeneration. It was recently shown that metformin, by activating an aPKC-CBP pathway, recruits neural stem cells and enhances neural function in mice and human cells, thereby providing a candidate pharmacological approach for nervous system therapy. My study examines if metformin would also activate similar pathways and neurogenesis for study with well studied planaria.</p> <p>Methods/Materials Basically, I divided two groups of planaria into 20 control individuals and 20 #treated# individuals. Each planaria was bisected behind the larynx the best I could. The treated group had an application of 50mM metformin solution to application group 1-20 for 20 minutes on day 1, and again on day 5. The control group remained as such. Both groups were maintained and observed alike.</p> <p>Results My observations indicated that the control cephalic regeneration control group showed the first signs of eyespots around day 7 and photoreceptors around day 10. The metformin application group showed slightly earlier regeneration a full day earlier with first signs of eyespots at day 6 and photoreceptors around day 9. Caudal regeneration did not appear accelerated. Accurate measurements were difficult because of movement, but were clearly observable. In both caudal and cephalic regeneration, the coloration of the application group was noticeably a lighter shade of brown until a several days after full regeneration had taken place.</p> <p>Conclusions/Discussion In conclusion, my results would suggest that the metformin did cause a noticeable increase in tissue regeneration speed and more specifically in the areas with a denser concentration of eyespot and photoreceptor neurological tissue, or perhaps denser concentrations of neoblasts. Under the influence of metformin it appears that the cephalic regeneration process is stimulated even more. Under the influence of metformin, caudal regenerative process appears to be retarded or the same as the control group.</p>	
Summary Statement In this experiment, I studied the potential use of less expensive planaria to examine the effects of the drug metformin on the speed of (neurogenesis) tissue regeneration.	
Help Received My advisor Dr. Morse supplied and handled the metformin drug for classroom compliance.	