

**2020 PSBR High School Essay Contest**  
**Grand Essayist**

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In 2019 doctors diagnosed approximately 96,480 new cases of melanoma of the skin. Skin cancer is the most prevalent type of cancer today and while basal cell carcinoma and squamous cell are much more common than melanoma, melanoma is the most dangerous type of skin cancer with an eighty percent mortality rate. But with exciting advances in treatments for skin cancer, including those supported by animal research, coming about those numbers may very well soon go down.

Surprisingly, neither rodents, rabbits, nor primates have helped this advancement come about. The real helpers come in the unlikely form of zebrafish, a small tropical fish that turn out to be some of the most valuable research animals in cancer. Since they are seventy percent genetically similar to humans it is very easy to look at the big picture of cancer and drugs can be added directly to the aquatic environment. Zebrafish also reproduce and develop very quickly and cheaply, making them great research subjects. Recently zebrafish have been used to research skin cancer because of the similarities with human skin cancer and their almost translucent skin making it easy to trace skin abnormalities.

By using zebrafish as human cancer models scientists isolated and identified signaling passageways that control cell division, migration, and death. When there were mutations in the Ras and PI3K pathways melanomas progressed rapidly. The mutations also passed down into the next generation. According to Understanding Animal Research, "In this they were strikingly similar to the human inherited syndrome FAMM (familial atypical mole and melanoma)." ("Targeting Skin Cancer") This discovery gives researchers invaluable insights into the formation of melanomas and possible treatments.

Zebrafish also helped scientists research other methods of fighting melanoma with gene suppression and inhibitors. By inhibiting the DODH gene, a gene that produces the enzyme dihydroorotate dehydrogenase, melanoma and neural crest cell growth is stopped. Blocking the transcriptional elongation of key genes in DODH suppresses the growth of melanomas. HEXIM1, hexamethylene bisacetamide inducible 1, is a tumor-suppressing gene that reacts to nucleotide stress in cells. It works with positive transcription elongation factor, P-TEFb, to control RNA elongation in transcription. These inhibitors worked in the Zebrafish model leading to more studies on developing a treatment for skin cancer.

While this treatment is not developed enough or in practice now, it gives me hope for both the future of skin cancer patients and my own. As a regular visitor to the dermatologist's office, I know a thing or two about the dangers of skin cancer. Besides the fact that both my aunt and my uncle had melanomas, my father has had multiple basal cell carcinomas in his lifetime, and I have already had two atypical moles biopsied and later removed at fifteen years

old; skin cancer is a real threat for me. And even if skin cancer never affects me, the patients suffering in the hospital right now deserve an efficient and affordable treatment. The use of zebrafish in skin cancer tests have proved invaluable in these advances, allowing the development of treatments that will save lives. With the knowledge gained from the research done with zebrafish, we can now move on to developing a successful treatment for skin cancer that targets the genes and molecules that cause it.

#### Works Cited

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