Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Good

Explanation to Applicant

This application focuses on the molecular basis of phenotypic plasticity in a human cancer cell line. In aim 1 RNAseq comparison of passage 9 and 26 of this cell line will be used to identify markers of phenotypic change. In aim 2 time-dependent diversification of single cells will be tracked. This application has the potential to result in a gain of knowledge in cancer biology.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Fair

Explanation to Applicant

This application has the potential to further our understanding of how clonal diversification drives heterogeneous responses in cancers. No outreach activities are outlined but a commitment to mentoring is given.

Summary Comments

The applicant has a solid academic record which is reflected by the enthusiastic support by [redacted] reference writers. [redacted] has experience in lab bench work as well as mentoring and outreach. The application is well structured but the lack of broader impacts and outreach activities reduce the enthusiasm for it.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Very Good

Explanation to Applicant

The applicant's research experience is very comprehensive in the field of cell biology, molecular biology, microbiology and bioinformatics obtained through undergraduate research and summer internships. The applicant has received several awards and golf scholarship for undergraduate studies. Proposed project aims to study molecular mechanism that cause phenotypic diversity in homogeneous eukaryotic cell population under selective pressure and takes holistic approach to address the hypothesis. The applicant has necessary research experience and resources to conduct proposed studies.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

The applicant participates as a mentor and lead high school students for college preparation workshops, leads activities related to student recruitment and retention groups, participates in STEM promotion in after-school elementary teaching program and has similar plans to continue community outreach for K-12 during graduate school. Proposed project will be helpful in understanding how homogeneous cells function under selective pressure.

Summary Comments

The applicant has very comprehensive research experience in multidisciplinary areas of life sciences and plans to conduct proposed research on phenotypic diversity of cell population under selective pressure using holistic and multidisciplinary approach. The quality of application, reference letters and GPA reflect a very bright and intelligent scientist with great potential in science and academia.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

Phenotypic plasticity, or the capability of a single genome to produce diverse phenotypes, is believed to regulate processes such as stem cell differentiation and epithelial-to-mesenchymal transitions. The main objective of the research proposed in this application is to quantitatively identify the molecular basis of phenotypic diversity in initially homogeneous eukaryotic cell populations. The applicant will perform a combination of experimental studies and mathematical modeling on a BRAF-mutant melanoma cell line. This is a well-written proposal and anticipated results/alternative approaches have been discussed.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

Research proposed in this application will use approaches from mathematics, physics, and chemistry to solve problems in quantitative biology. The applicant will use these tools to understand cancer heterogeneity on multiple biological scales. Knowledge gained from these studies have the potential in developing novel strategies to overcome non-genetic mechanisms of drug resistance. The applicant plans to use [redacted] resources to train students from diverse backgrounds to prepare them for STEM careers.

Summary Comments

This is a well-written application. Both IM and BI aspects of this proposal are well described.