**1.** While a computational workflow, such as our senior design project, may seem like it does not involve any apparent ethical issues, there are several issues that are present underlying the way our final product is marketed to the world. An immediate question at hand is the purpose and validity of a predictive, computational workflow. Based on the interviews our senior design team conducted last quarter, it was brought apparent to us that there are many scholars who do not believe in computationally-derived biological predictions. Our product can easily be misunderstood as a tool that advises people on what drugs to take for certain cancer mutations.

**Ethical question:** Are cancer therapeutic strategies designed by predictive, computational workflows valid and safe?

The scientific community and the general public have to be educated and understand that the computational workflow provided is a tool to be used alongside drug discovery. By no means are we using this to replace conventional therapeutic discovery strategies. What our product really does is generate hypotheses for mechanisms that can be exploited for cancer therapeutics. This will provide novel understanding of cancer therapeutic mechanisms as well as streamline the process of drug discovery. However, not knowing this distinction is understandable. Therefore, it is imperative to, as ethical engineers, be explicit about the purpose of the workflow and to make it known that the workflow is to be used as a tool that aids the process of therapeutic discovery.

The ethical question involves members involved in creating this workflow, scientists involved in cancer therapeutic research, pharmaceutical companies, the FDA, oncologists, and ultimately cancer patients. This involves everyone responsible in creating, approving, administering, and receiving cancer therapy.

Section II.1, 2, 3, and 5 (Rules of Practice) are relevant to this ethical dilemma. In general, our product will have to be transparent, explicit, and informative in letting it be known that our product is a tool to supplement the cancer drug discovery process and not act as a final say in how a cancer patient should be treated. We will have to “perform services only in the areas of their competence” as we generate hypotheses that are testable in a research setting. We will “avoid deceptive acts” by suggesting testable hypotheses for the purpose of having to be experimentally validated as a successful drug strategy1. If the purpose of our workflow is explicitly marketed and educated to all relevant parties, then there will not be ethical violations as per the NSPE Code of Ethics.

**REFERENCES: [1]** Nspe.org,. "Code Of Ethics | National Society Of Professional Engineers". N.p., 2016. Web. 9 Feb. 2016.

**2. Video Idea and Script of your design or solution.**

**Overview**: Describe how current cancer therapies are discovered. Talk about their cons and what is needed to improve them. Ultimately show how our tool can help this problem.

**Visuals**: snapshots and examples/demonstrations of the interactive components of our platforms showing ease of use

*<script start>*

How are cancer therapeutic drugs currently being created by pharmaceutical companies right now? Current drug companies test large banks of molecular compounds to see if they are successful in treating cancer. However, how these drugs are successful in treating cancer are relatively unknown. Furthermore, it’s ambiguous if the drug will be successful on a particular patient, let alone side effects.

In order to design personalized drugs, we need to understand the mechanism of the cancer therapy. To that end, we have designed a tool that allows researchers to understand the effects of a metabolic cancer mutation on a systems level. It is a user-friendly platform that allows biologists to gain a variety of relevant information in understanding how the mutation is causing the cancer. This process will generate hypotheses behind the mechanism behind the cancer mutation which can be experimentally validated. Using this information, drugs can be used to exploit the characterized cancer mutation and its effects for personalized and effective cancer therapy.

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