Docket #: S23-066

Germline and Cancer Subtypes for Monitoring and Treatment

Researchers at Stanford have developed practical applications that use germline information (e.g., germline epitope burden) for diagnosis, monitoring and treatment of cancer.

Cancer represents a wide spectrum of molecularly and morphologically diverse diseases. Individuals with the same histopathological classification can have tumors with drastically different molecular profiles and clinical responses to treatment. Malignancy is defined by a set of abnormal biological capacities, termed the hallmarks of cancer, and decades of histopathologic and molecular profiling of human tumors have demonstrated that there are multiple ways cells can acquire each hallmark. As a result, the molecular profile of tumors with the same clinical characteristics can vary dramatically from individual to individual, and it is unclear when these molecular differences originate, all of which can impact treatment options. Finally, current prediction of relapse is generally only 1-5 years, and it is desirable to obtain more accuracy to determine proper treatment and when a pre-malignant tumor will become malignant.

Stage of Development
Research – in vitro

Stage of Research
The inventors have developed methods to use (i) a tumor subtype (malignant or premalignant) of a subject, e.g. whether a particular cancer has an alteration in a particular region, and (ii) germline epitope burden for the particular region, e.g. amount of peptide epitopes generated from the germline of a subject, to determine the probability: (i) of a relapse of a particular tumor subtype, (ii) of immune response given a particular subtype, and (ii) that a pre-malignant lesion will become malignant.

Applications

- Methods to investigate germline-mediated immunoediting
- Molecular modeling for improving cancer risk stratification
- Predicting relapse of a particular tumor subtype in a subject
- Predicting immune response of a particular cancer subtype in a subject
- Predicting the risk of premalignant tissue becoming cancerous in a subject

Advantages

- Using a measurement of epitope subtype burden, along with tumor subtype, can increase accuracy of relapse prediction.
- Epitope burden and tumor subtype can also be used to determine efficacy of immune therapies for a particular subject, as well as a risk that a pre-malignant tumor will become malignant.

Publications

- Houlahan, K., Khan, A., Greenwald, N., West, R., Angelo, M., Curtis, C. Germline-mediated immunoediting sculpts breast cancer subtypes and metastatic proclivity. bioRxiv (March 16, 2023).

Patents

- Published Application: WO2024192107

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