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Novel Biomarkers for Detecting Epstein-Barr Virus-Associated Gastric Cancer

Gastric cancer (GC) is a major health public problem in many countries, with more than 1 million new cases, worldwide, in 2018, contributing to almost 800,000 deaths. And new research suggests that GC may be on the rise in the US, particularly among younger adults. Early detection of GC often allows for greater therapeutic options, however, because routine screening is not common, most people are diagnosed at a more advanced stage with limited treatment options.

Epstein-Barr Virus (EBV) is one of the most common human viruses, affecting more than 90% of adults, and its involvement is implicated in almost 10% of all GC cases. However, the association of EBV infection and gastric cancer is still unclear. Distinguishing EBV+GC from EBV-GC could enable targeted therapies and precision medicine.

Researchers at the Biodesign Institute of Arizona State University have developed a panel of antibodies for identifying patients which may either be at risk of developing, or already have EBV-associated gastric cancer. Using nucleic acid programmable protein arrays (NAPPA), an EBV proteome array was constructed and the anti-EBV immune response was profiled in both EBV+GC and EBV-GC patients. A set of twelve anti-EBV antibodies were identified, and 10 were further verified and blindly validated in an independent sample set.

This antibody panel, and the specific associations with GC may help stratify patients into high or low risk categories and even help in the early diagnosis or treatment of GC.

Potential Applications

- Identifying patients at risk of developing EBV-associated gastric cancer
- Diagnosis of EBV-associated gastric cancer
- Vaccines for gastric cancer
- Development of an EBV+GC antibody signature
- Potential new EBV+GC targets for precision medicine and therapies

Benefits and Advantages

- Seropositivity for certain antibodies was associated with at least a 4-fold increase in GC risk relative to a healthy control
- Could detect GC prior to or even in the absence of symptoms
- The antibody panel was well validated by a stringent two-step ELISA that included verification and blinded testing on an independent sample set
- A prediction panel of three antibodies could distinguish between EBV+GC and EBV-GC with an AUC value of 0.87, 79.2% sensitivity at 95% specificity
- The target proteins of the EBV antibodies could provide new targets for precision medicine and targeted therapies

For more information about the inventor(s) and their research, please see

Dr. LaBaer's departmental webpage