Adoptive T-cell immunotherapy to treat cancer caused by Epstein-Barr virus

Unmet Need

Epstein-Barr virus (EBV) is an infectious disease that has been shown to cause a number of cancers originating from EBV-afflicted cells. Across the globe, EBV is associated with approximately 200,000 cases of malignancies each year including lymphatic and epithelial cell-based cancers. Nasopharyngeal carcinoma (NPC), which occurs most prevalently in southeast Asia, is an epithelium-based malignancy that is often caused by infection with EBV. In 2012 alone there were 86,691 cases of NPC. Due to many cases of NPC being associated with EBV, adoptive T-cell immunotherapy is a highly possible method for treating EBV-associated cancers. There is a need for developing immunotherapeutic drugs that are capable of targeting EBV-positive NPC and lymphoma for effective treatment.

Technology

Duke inventors have developed a cell therapy that can target EBV-specific proteins that are present in an estimated 20% of NPC cases. This is intended to be used by oncologists as an immunotherapeutic cancer treatment option for patients with NPC. Specifically, Duke inventors discovered two novel T-cell receptor (TCR) sequences that are activate in response to the EBV antigen latent membrane protein 2 (LMP2). These patient-specific TCR T-cells can be developed within 3 weeks, enabling faster therapeutic response. Both discovered TCR sequences have been demonstrated in vivo to specifically kill lymphoma cells that were engineered to express the LMP2 peptide linked to the HLA-A11 antigen that is particularly common in east Asia. This specific toxicity indicates an effective response for treating cancers that present the viral
LMP2 antigen associated with EBV-derived NPC. Clinical testing is the next step for the development of this novel immunotherapeutic drug treatment.

**Other Applications**
This technology could also be used for EBV-associated cancers other than NPC, given that the LMP2 antigen is present.

**Advantages**
- Rapid, patient-specific drug development
- Specific cytotoxicity to EBV-associated cancers
- Utilizes novel TCR sequences to target EBV-specific proteins

**Duke File (IDF) Number**
IDF #: T-006428

**Meet the Inventors**
Wang, Xiao-Fan *Chinese name is 王小凡。*
Alexander, Peter
Chen, Rui *Chinese name is 陈锐*
Li, Qi-Jing *Chinese name is 李启靖*
Wang, Guoping *Chinese name is 王国萍*

**Contact For More Info**
Ferguson, Christy
919-681-7581
christy.ferguson@duke.edu

**Department**
Pharmacology and Cancer Biology

**External Link(s)**
- From the lab of Xiao-Fan Wang