Chimeric immunotoxins targeting IL-13Rα2 positive human cancers

Technology Summary

Many human cancers overexpress high affinity receptor for type 2 cytokine IL-13 called IL-13 receptor alpha 2 (IL-13Rα2) including head and neck cancer, prostate cancer, colorectal cancer, breast cancer, stomach cancers and cervical cancers. FDA inventors created recombinant chimeric protein fusions composed of an IL-13 targeting domain and a death inducing domain to specifically target and eliminate IL-13Rα2 positive human cancer cells. The targeting domain consists of either IL-13 or an antibody against IL-13Rα2. The other domain can be truncated Pseudomonas exotoxin (IL-13-PE), BCL2 associated agonist of cell death (IL13-BAD), or Fas-associated protein with death domain (IL13-FADD) that will kill the tumor cell.

Pancreatic ductal adenocarcinoma (PDAC) is an extremely aggressive solid cancer, with high mortality, and often painful due to perineural invasion (PNI) where cancer cells invade the surrounding nerves. PDAC commonly overexpresses IL-13Rα2 (≥ 75%), and the overexpression of IL-13Rα2 showed a correlation with worse pathologic grade and clinical stage of the disease. Thus, IL-13R targeted immunotoxins may not only inhibit primary tumor growth and metastasis but may also decrease PNI induced pain in patients with PDAC and other cancers.

Potential Commercial Applications

- Therapeutic for highly aggressive pancreatic ductal adenocarcinoma (PDAC)
- Personalized medicine for treating cancers overexpressing IL-13Rα2

Competitive Advantages

- Treats metastasis in addition to primary tumor
- As IL-13Rα2 overexpression is found in tumor cells undergoing perineural invasion the therapeutic alleviate the associated pain

Development Stage: In vivo animal data

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Publication(s):

Fujisawa T, Shimamura T, Goto K, Nakagawa R, Muroyama R, Ino Y, Horiuchi H, Endo I, Maeda S, Harihara Y, Nakajima A, Matsuhashi N, Kato N, Isayama H, Puri A, Suzuki A, Bellayr I, Leland P, Joshi BH, Puri RK. A Novel Role of Interleukin 13 Receptor alpha2 in Perineural Invasion and its Association with Poor Prognosis of Patients with Pancreatic Ductal Adenocarcinoma. Cancers (Basel). 2020 May 20;12(5):1294.

Ferreira TP, de Arantes AC, do Nascimento CV, Olsen PC, Trentin PG, Rocco PR, Hogaboam CM, Puri RK, Martins MA, Silva PM. IL-13 Immunotoxin Accelerates Resolution of Lung Pathological Changes Triggered by Silica Particles in Mice. Immunol 2013 Nov 15;191(10):5220-9.

Intellectual Property:

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