Researchers shorten time for manufacturing of personalized ovarian cancer vaccine

December 26 2011

(Medical Xpress) -- Researchers from the Perelman School of Medicine at the University of Pennsylvania are in the midst of testing a personalized, dendritic cell vaccine in patients with recurrent ovarian, primary peritoneal or fallopian tube cancer – a group of patients who typically have few treatment options. Now, they have shown they can shorten the time to manufacture this type of anti-cancer vaccine, which reduces costs of manufacturing the treatment while still yielding powerful dendritic cells that may be beneficial for these and a variety of other tumor types. The data is published in the December issue of *PLoS ONE.*

“We are very excited about this development,” says senior author George Coukos, MD, PhD, who directs the Ovarian Cancer Research Center in Penn’s Abramson Cancer Center. “Our work proves that these dendritic cells can be manufactured with a reasonable cost and retain their potency after being loaded with patients’ tumor extract. This is a very personalized approach to immunotherapy, which can be easily prepared for most patients with ovarian cancer undergoing surgery to remove their tumors.”

Cancer researchers have long predicted that vaccines that stimulate a patient's own immune system to attack tumors should be able to control the disease. The use of dendritic cells is one especially promising avenue for immune therapy, particularly for patients with small tumors or those who are in remission. In ovarian cancer, this condition is often possible to achieve after aggressive surgery and conventional chemotherapy. At

that point, dendritic cells presenting tumor antigen, and properly activated with a microbial extract (lipopolysaccharide) and cytokines, become able to mobilize the immune system to attack the cancer and restrain tumor progression.

Previous work from Penn showed that dendritic cell vaccines developed in culture over two days could shrink of pre-invasive breast cancers in patients when a single protein antigen was used with the dendritic cells. However, dendritic cell vaccines prepared from the cellular debris of whole tumors -- which is thought to be more powerful than single antigens -- previously required seven days of maturation in a dish.Coukos and colleagues report that in preclinical tests, dendritic cells exposed to pieces of whole tumors, called tumor lysate, and matured in culture for four days are just as robust as dendritic cells grown for seven days.

To determine whether a shorter maturation period was possible, the team isolated peripheral blood monocytes, a type of white blood cell, from ovarian cancer patients and healthy volunteers. Using established clinical-grade protocols, the team induced the cells to differentiate into immature dendritic cells and then exposed them to whole tumor lysate for two, four, or seven days.

When they compared protein markers on cells' surfaces, they found that the majority of the dendritic cells remained immature at two days, whereas the majority of the cells were mature at day four. The difference, the authors explain, means that the day-four cells have machinery in place to process and present the complex mixture of proteins and antigens present in a whole tumor lysate. By contrast, the immature day-two cells can present a single peptide antigen on their surface, but lack the machinery to process the larger proteins or more complex mixtures of proteins, like those present in whole tumor lysate.

The team found that day-four dendritic cells exposed to whole tumor lysate induced T-cell responses from both patient and healthy donors in test tube experiments, and that the responses were similar to those triggered by day-seven dendritic cells.

"Given the overall superior performance of whole-tumor lysate preparations over molecularly defined antigens for cancer vaccines and the overall superiority of dendritic cell-based vaccines, our results provide important preclinical data for the rapid development of potent, highly immunogenic vaccines for treating many tumor types," says lead author Cheryl Lai-Lai Chiang, PhD, a post-doctoral researcher in the Center for Ovarian Cancer Research.

More information about the vaccine clinical trial is available at clinicaltrials.gov.

Provided by University of Pennsylvania School of Medicine

Citation: Researchers shorten time for manufacturing of personalized ovarian cancer vaccine (2011, December 26) retrieved 5 May 2024 from https://medicalxpress.com/news/2011-12-shorten-personalized-ovarian-cancer-vaccine.html

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.