Blood test for VEGF-A, TGF-B1 could help determine treatment options for esophageal cancer patients

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A blood test may be beneficial in indicating neoadjuvant treatment regimens for patients with esophageal squamous cell carcinoma (ESCC), according to research presented today at the American Society for Radiation Oncology's (ASTRO's) 56th Annual Meeting. Results of a nine-year study of patients undergoing concurrent chemotherapy and radiotherapy (CCRT) for esophageal cancer show that levels of two proteins found in the body, vascular endothelial growth factor-A (VEGF-A) and transforming growth factor-β1 (TGF-β1), indicate patients' pathological response and disease-free survival rates.

In order for a cancer to metastasize, the growth of a new network of blood vessels is necessary. This process of forming new blood vessels is called angiogenesis. Tumor angiogenesis is the proliferation of a network of blood vessels that penetrates into cancerous growths, supplying nutrients and oxygen, and removing waste products. VEGF-A plays a crucial role in facilitating tumors to form their supplying vessels needed for growth and metastasis.

TGF-β1 contributes to tumor invasion and systemic tumor spread, and overexpression of TGF-β1 has been reported as a negative predictor in esophageal cancer.

This study evaluated serum (blood) samples of 103 total patients with esophageal squamous cell carcinoma (ESCC) from 2004 to 2013. All

patients received preoperative CCRT (taxane-/5-fluorouracil-based chemotherapy and 40 Gy dose of radiation therapy) prior to esophagectomy (surgical removal of a part of the esophagus).

Serum samples were collected from patients before and within one month of completion of CCRT. Researchers first used a proximity ligation assay (PLA) technique to screen for 15 serum biomarkers in 79 patients to evaluate the biomarkers' association with pathological tumor regression on surgery and survival. (A biomarker is a measurable indicator of disease state and can serve as a parameter to measure the progress of disease or the effects of treatment.)

The biomarkers significantly associated with pathological response (PathR) and survival rates were further analyzed by traditional enzyme-linked, immunosorbent assay (ELISA), a wet-lab test that uses antibodies and color change to identify a substance, to confirm initial biomarker findings by PLA in the total group of 103 patients. Associations between serum levels of biomarkers and clinical factors correlating with PathR, disease-free survival (DFS) and overall survival (OS) were evaluated by the Analysis Of Variance (ANOVA) and log-rank tests.

Researchers found that patients with high VEGF-A were less likely to achieve complete tumor regression (a decrease in the size of a tumor or in the extent of cancer in the body), and that the survival rates were lower among patients who had high VEGF-A and high TGF-β1 levels before treatment. With a median follow-up of 33.7 months, the median DFS for the entire patient group was 21.9 months, and the median OS was 42.3 months. Following CCRT, 38 patients (37 percent) had complete tumor disappearance, 44 (43 percent) had minimal disease, and 21 (20 percent) had gross residual tumor at the time of their surgery.

On ELISA, both pre- and post-CCRT VEGF-A levels were significantly correlated with PathR ($p=0.042$ and 0.019, respectively). Patients with

pre-treatment VEGF-A of less than 250 pg/ml were more likely to have pathologically complete response after CCRT (57.1 percent, or 20/35) compared to patients with VEGF-A of more than 250 pg/ml (26.5 percent or 18/68, p=0.002).

Patients with high pre-CCRT VEGF-A/TGF-β1 levels (≥ median) had significantly worse median DFS compared to those with lower levels, and worse median OS (19.2 months vs. 46.2 months, p=0.07). On multivariate analysis, PathR (p

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