Weill Cornell Medicine

DARC Diagnostic Test for Tumor Immunotherapy

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Background & Unmet Need

- The Duffy Antigen Receptor for Chemokines (DARC), also known as Atypical Chemokine Receptor 1 (ACKR1), plays a major role in the regulation of circulating pro-inflammatory chemokines
- A mutation in the DARC/ACKR1 gene, rs2814778, results in a Duffy-null allele
- African American (AA) cohorts have over 70% allele frequency of this allele, and it is well known that pre-menopausal AA women have higher incident rates of breast cancer
- However, the impact of DARC expression on treatment outcomes is unknown
- **Unmet Need:** Improved understanding of the role of DARC expression to guide treatment decisions

Technology Overview

- **The Technology:** Method for measuring DARC expression levels as a prognostic indicator of a patient's response to tumor immunotherapy
- **The Discovery:** Breast cancer patients with DARC-high tumors had significantly longer overall survival (OS) and relapse-free survival (RFS) compared to patients with DARC-low tumors
- DARC-high tumors were also found to have significantly higher levels of the chemokine CCL2 but significantly lower levels of the chemokine CXCL8
- Tumor immune cell populations were also found to be directly correlated to DARC expression, in all intrinsic tumor subtypes
- Patients with DARC-high tumors may be more responsive to immunotherapies (e.g., checkpoint inhibitors), whereas patients with DARC-low tumors may benefit from chemotherapy, radiation therapy, and surgery

Inventors:
Melissa Davis

Patents:
US Application Filed
EP Application Filed

Publications:
Jenkins et al. *Can Epi Bio Prev.* 2019.
Davis et al. *PLoS One.* 2015.

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Technology Applications

- Prognostic indicator of patient response to immunotherapies
- Predictor of long-term patient outcomes

Technology Advantages

- Strong correlation between DARC expression and breast cancer survival
- Test may be performed either through genetic testing or direct measurement of DARC protein levels
- Potential to be applied to additional tumor types beyond breast cancer

Supporting Data / Figures

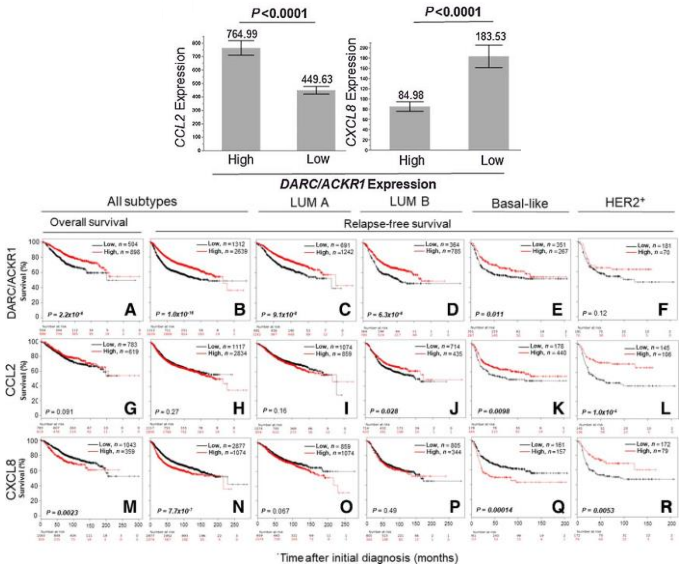

Figure 1: DARC expression is positively correlated with CCL2 and negatively correlated with CXCL8 expression. DARC expression is also significantly associated with improved survival.

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