Precision Medicine for Optimization of Treatment Population of Immunotherapy

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Immunotherapy including anti-cytotoxic T-lymphocyte-associated protein 4 (CLTA-4) antibody (ipilimumab), anti-programmed cell death protein 1 (PD-1) / programmed death ligand 1 (PD-L1) antibody (nivolumab, pembrolizumab, cemiplimab; atezolizumab, avelumab, durvalumab), chimeric antigen receptor T cell (CAR-T) (tisagenlecleucel, axicabtagene ciloleucelz) has revolutionize cancer systemic therapy. Two biomarkers predictive of responses to cancer immunotherapy had been incorporated to the clinical practice. One is tumor PD-L1. Patients with non-small cell lung cancer with PD-L1 tumor proportional score $\geq$ 50% have a higher response rate, longer progression free survival, and longer overall survival to pembrolizumab vs. platinum-based chemotherapy. The other is microsatellite instability (MSI) high / deficient mismatch repair (MMR) status of the tumor. MSI high / deficient MMR tumors (e.g. some colorectal cancer) are responding to pembrolizumab. Other predictive biomarkers are emerging, such as tumor mutational burden (>10 mutations / megabase), gamma interferon signature.