Changes in the repertoire of circulating antibodies is a promising biomarker for various diseases. We have developed microarrays containing more than thousands of peptides with random amino acid sequences that can be used to analyze the entire repertoire of circulating antibodies. Using these peptide microarrays, we have shown that in the blood of patients diagnosed with breast cancer (BC) antibodies interacting with certain peptides are found. Moreover, circulating antibodies of patients with different molecular subtypes of BC (luminal A, luminal B and Basal-like) interact with different, but overlapping, panels of peptides. We have selected 634 peptides from 120K peptides presented on microarrays that specifically interact with circulating antibodies of blood plasma from patients with various subtypes of BC. This panel of peptides that specifically interact with the blood plasma immunoglobulins of patients with various molecular BC subtypes can be used for the development of non-invasive diagnostic test systems. Microchips containing thousands of peptides can be used as a tool for molecular screening populations at risk for various diseases. Thus, peptide microarrays can be used to create a new tool for studying the repertoire of circulating antibodies for different diseases evaluation, as well as for studying and evaluating protein-protein interactions.