ABSTRACT: Metastasis contributes to over 90% of cancer-related deaths. Many types of cancer metastasize via the bloodstream, where circulating tumor cells (CTCs) originating from the primary tumor can travel through the circulation or lymphatic system and engraft in distant organs. In an effort to neutralize CTCs with the potential to form new tumors, a new therapeutic approach has been developed in which circulating blood cells are functionalized with TRAIL protein that will induce cancer cell death upon contact. The TRAIL-coated leukocytes, presenting therapeutic protein on their surface, have been found to effectively eliminate cancer cells from the bloodstream and lymph nodes in mice, and in cancer patient blood samples subjected to fluid flow. I will share exciting new results showing effective prevention of distant metastasis via treatment before and after surgical resection of breast tumors in immunocompetent mice, and tests of the efficacy of TRAIL liposomes in treating cancer patient blood samples under flow conditions. Finally, I will show a new platform technology for the delivery of therapeutics that exploits the natural process of DNA netosis, where cellular DNA is rapidly exteriorized by neutrophils in response to cytokine stimuli. We have engineered supercharged proteins which immobilize on the DNA nets and successfully neutralize metastatic cells.