

My doctoral research focused on activating the immune system to eliminate cancer cells and establish long-term, specific immunity to prevent cancer recurrence. Additionally, I aimed to enhance the safety and efficacy of this immunotherapy through chemical methods and materials engineering. Ultimately, I successfully developed lipid nanodiscs that deliver innate immune agonists, IMDQ and diABZI, with suitable physicochemical properties for therapeutic use. Both *in vitro* and *in vivo* experiments demonstrated the formulation's excellent ability to clear tumors and prevent recurrence. Treated tumor-bearing mice became tumor-free and remained healthy for long-term survival. Even after subsequent tumor cell challenge, they did not develop tumors due to the establishment of memory immunity. This work not only ensured the treatment's effectiveness but also significantly improved its safety, providing valuable insights for the clinical translation of similar therapies.