Siemens Competition
Math : Science : Technology
National Finalist

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Project Title: *A Novel Therapy for the Treatment of Acute Myeloid Leukemia*

Acute myeloid leukemia (AML), as the most common adult acute leukemia, is a life-threatening disease characterized by uncontrolled proliferation and accumulation of white blood cells. The majority of patients relapse within 5 years, and no new therapies for AML have been approved for more than 30 years. Recent studies suggest that leukemia stem cells are responsible for the initiation, development, and relapse of AML, and depletion of both leukemia stem cells and mature leukemia cells is needed to eradicate this difficult disease. In our effort to identify new AML targets through bioinformatics analyses, we found that the expression of leukocyte immunoglobulin-like receptor family B4 (LILRB4), a cell surface receptor, inversely correlates with the overall survival of AML patients. To test the hypothesis that LILRB4 supports AML development, we first measured the expression of LILRB4 in AML patient leukemia cells by using the immunostaining and flow cytometry technique. We observed that LILRB4 is highly expressed on monocytic AML cells and can also be co-expressed with a leukemia stem cell marker CD34. This result suggests that LILRB4 can be expressed by both monocytic AML stem cells and mature leukemia cells. We then performed in vitro experiments to knockdown LILRB4 expression in human monocytic AML THP-1 cells using shRNA. We found that LILRB4 is essential for the growth of leukemia cells. Furthermore, from in vivo experiments we were able to show that an anti-LILRB4 blocking antibody is capable of eliminating human AML in a xenograft mouse model. Our study indicates that LILRB4 plays a key role in AML development and that anti-LILRB4 monoclonal antibodies are promising novel drug candidates for treating AML.