

ACHIEVEMENTS

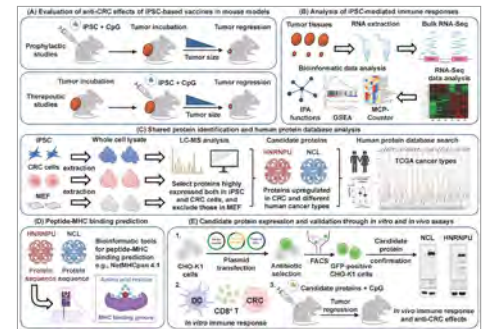
# iPSC-based Vaccines: New Hope for Preventing and Treating Colorectal Cancer

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Induced pluripotent stem cells (iPSCs) are pluripotent cells, generated through genetic reprogramming techniques, recognized for their high potential in disease modeling, drug discovery, and regenerative medicine. Previous studies have shown that iPSCs share many tumor-associated antigens with human cancer cells and can prevent tumor formation in various cancer-bearing mouse models, including breast, skin, and pancreatic cancers. However, the precise molecular mechanisms have not been deciphered, and whether iPSCs potentially could be developed into therapeutic cancer vaccines remains unknown.

A research team led by Prof. Tzu-Tang Wei of the Department and Graduate Institute of Pharmacology, National Taiwan University College of Medicine, has discovered that cell lysates prepared from iPSCs, when combined with the immune adjuvant CpG, can prevent as well as treat colorectal cancer growth in mouse models. Through mass spectrometry analysis and computational prediction, the team identified that HNRNPU and NCL proteins are highly expressed in both iPSCs and colorectal cancer cells but expressed at low levels in healthy cells. Cellular and animal experiments further confirmed that these two candidate proteins can be presented by dendritic cells to activate T cells, to elicit an immune response against colorectal cancer. These findings confirm the potential of iPSCs as vaccines for colorectal cancer and disclose their underlying immune mechanisms, providing a new foundation and perspective for the development of cancer immunotherapies and cancer vaccines.

These breakthrough findings were published on April 28, 2025 in *Theranostics*, a leading journal in the biomedical field. Prof. Wei was the corresponding author, and graduate students Si-Han Jwo, Shang-Kok Ng, and Chin-Tzu Li were equal co-first authors. Observing that the project took more than six years to complete, Prof. Wei expressed his gratitude to National Taiwan University and the National Science and Technology Council for their generous support. The team continues to undertake translational research on cancer vaccines.



Overview of antigen prediction and testing of the potential iPSC-based vaccine for treating as well as preventing colorectal cancer.



Prof. Wei's research group at NTU.



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