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Professor Chang-Duk Jun's research team develops next-generation anti-cancer drug by utilizing star-shaped immune cells

▫ GIST (Gwangju Institute of Science and Technology) School of Life Sciences Professor Chang-Duk Jun's research team developed a next-generation anti-cancer immune cell therapy* substance that treats diseases by activating the body's immune response using dendritic cells**, which are star-shaped immune cells.

◦ This research overcomes shortcomings of using existing viruses such as high cost and efficiency by making pharmaceuticals to introduce biofactors into cells, which is expected to double the effectiveness of chemotherapy by immediately treating dendritic cells in cancer patients with poor immune function.

* anti-cancer immune cell therapy: By activating the body's immune response using dendritic cells, natural killer cells, and T cells to strengthen the lowered immune function to enhance the natural healing power of the body, it is a treatment that attacks cancer by collecting immune cells, the center of resistance, and cultivating them strongly, activating them, and then returning them back to the body.

** dendritic cells: A cell in the mammalian immune system that transfers information from external invaders to T cells, thereby increasing T cells' aggression.

- When external invaders (antigens) enter the body or cancer cells grow, dendritic cells capture antigens or cancer cells and move to the lymphoid organs through a series of processes that enable immune cells to recognize them well, thereby delivering antigens to immune T cells.

- The mobility of dendritic cells and their binding to immune T cells are controlled by actin cytoskeleton. These actins play the same role as the bones of cells, making them move constantly and controlling immune responses, which is a very important component.

- Over the years, the research team has been studying the protein Transgelin-2, which regulates the function of these actins, to identify its involvement in cell mobility as well as its activity in various immune cells.

- This research team proved that dendritic cells deficient in the actin-regulating protein Transgelin-2 cannot move to the secondary lymphoid organs and induce normal immune cell activity and growth, thus failing to trigger an immune response. This study revealed that the expression of Transgelin-2 is an indispensable factor in maintaining normal function of dendritic cells.

- Based on academic studies, Professor Chang-Duk Jun's research team produced Transgelin-2 recombinant protein that can be introduced into cells and stably maintained in cells based on these basic academic mechanism studies. Transgelin-2-deficient dendritic cells were treated with this, and Transgelin-2 was re-expressed to recover the function of abnormal dendritic cells.

- The research team demonstrated that tumor formation is effectively inhibited by showing a 50% reduction in tumor size compared to the control group when the tumor is induced after preinjecting normal dendritic cells into the laboratory mice.

- Professor Chang-Duk Jun said, "The results of this study are significant in that it is the first case in which dendritic cells were used to show anticancer effects through internal substances that play a major role in the cells. By developing a combination therapy with cell vesicles that transport immune checkpoint inhibitory proteins, which are currently in progress, we will establish a vaccine anti-cancer strategy based on next-generation dendritic cells."

- This research was conducted by GIST Professor Chang-Duk Jun's research team with support from the Creative Research Initiative Program and the Bio & Medical Technology Development Program through National Research Foundation, the Ministry of Education, the National R&D Program for Cancer Control, the Ministry for Health and Welfare, and the GIST Research Institute and was published online on March 17, 2021, in the *Journal of Hematology & Oncology*, a top 3% journal in the field of oncology.

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