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Preventing chemotherapy-induced peripheral neuropathy using a combination treatment

Stanford scientists have developed a working model that chemotherapy drugs induce peripheral neuropathy by activating a pathway that favors neuronal degeneration and impairs sensory neuron function. Combining modulation of factors downstream of this degenerative pathway with chemotherapy represents a promising strategy to prevent chemotherapy-induced peripheral neuropathy without compromising tumor growth inhibition.

40%-60% of patients treated with anticancer drugs develop chemotherapy-induced peripheral neuropathy (CIPN). CIPN symptoms, such as tingling or numbness in the hands and feet, difficulty walking, and other challenges with daily activities, significantly deteriorate the quality of life and commonly develop into persistent, chronic neuropathic pain. As a result, the healthcare costs associated with CIPN are substantial, with treatment expenses for patients suffering from CIPN exceeding those for patients without the condition by $15,000 (in 2006 dollars). With the number of cancer survivors projected to top 20 million by 2030, preventing CIPN is both a pressing and a growing healthcare challenge.

Activating the neuronal degenerative pathway through overexpression and treatment with a chemotherapy drug in C. elegans impairs touch sensation which recapitulates symptoms if CIPN seen in patients. Importantly, in mice, knockout animals that genetically lack the downstream factors are less sensitive to chemotherapy than their wild-type littermates suggesting inhibition of this pathway may be preventative of CPIN. Importantly, targeting downstream factors makes it unlikely that tumor growth inhibition will be compromised during chemotherapy. Consequently, a combination treatment strategy can potentially prevent or minimize chemotherapy-induced peripheral neuropathy in oncology patients.

Stage of Development:
Research – *in-vivo* data
Continued research – Using several biological models to validate that the pathway is an effective treatment target for preventing chemotherapy-induced peripheral neuropathy

Applications

- Prevention of chemotherapy-induced peripheral neuropathy
- A combination therapy for cancer treatment

Advantages

- There are currently no FDA-approved chemotherapy-induced peripheral neuropathy treatments
- Potential for few on- or off-target effects

Patents

- Published Application: WO2024263795

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