Researchers identify drug characteristics that make cancer metastasis therapy more effective

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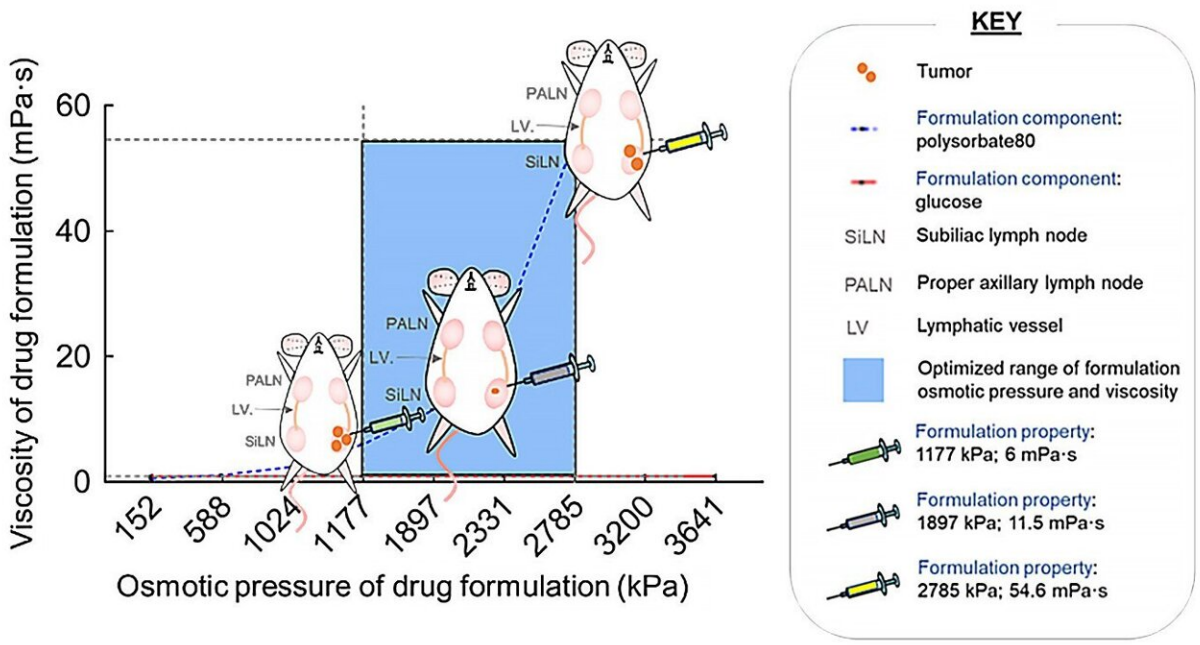

Optimal osmotic pressure and viscosity ranges for anticancer drug solvents used in lymphatic delivery (blue area). It is applicable to all types of cancer. Credit: Tohoku University

Cancer is an umbrella term for diseases characterized by the uncontrollable growth of tumor cells. Often, these tumor cells invade and colonize adjoining organs, giving rise to what is clinically referred to as

metastasis.

Once a lymph node is infiltrated by tumor cells, its environment becomes riddled with multiple anomalies. These anomalies pose numerous drug transport barriers, hindering effective treatment. Conventional intervention strategies have yet to address the challenges of treating metastatic lymph nodes.

The lymphatic drug delivery system (LDDS) is a promising therapeutic intervention for metastatic lymph nodes. LDDS sees drugs injected directly into sentinel lymph nodes under ultrasound guidance, to elicit a robust antitumor response. It was established under the leadership of Professor Tetsuya Kodama, from Tohoku University's Graduate School of Medical Engineering, as an alternative to current drug delivery strategies.

Now, Professor Kodama and a collaborative group have developed a novel drug formulation that enhances the therapeutic response of carboplatin, a commercially available anticancer agent, when delivered using a LDDS.

The group included doctoral student Radhika Mishra, also of Tohoku University's Graduate School of Medical Engineering, collaborating with Dr. Kiyoto Shiga of Iwate Medical University Hospital and Dr. Arun Kumar Dorai of the Institute of Multidisciplinary Research for Advanced Materials at Tohoku University.

The formulation, comprising polysorbate, has an elevated osmotic pressure and viscosity relative to saline (1897 kPa, 11.5 mPa·s). This allows it to favorably alter the lymph node environment, increasing drug penetration into the metastases and amplifying the drug's antitumor effects.

"Our work outlines the critical variables impacting the therapeutic response of drugs delivered by LDDS and highlights the importance of developing multi-pronged approaches for developing efficient strategies to fight cancer," says Kodama.

Details of the group's research were published in the journal *Cancer Science* on September 28, 2022.

More information: Radhika Mishra et al, Drug formulation augments the therapeutic response of carboplatin administered through a lymphatic drug delivery system, *Cancer Science* (2022). DOI: 10.1111/cas.15599

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