Cancer and the Nervous System: Using nanotechnology to target cancer associated neurons as a tool for treating breast cancer

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It has been discovered that there is a connection between the nervous system and cancer progression. Cancer cells can grow and invade the nerves in the tumor microenvironment, and use it as a mean for metastatic spread. Moreover, nerves and their axons actively infiltrate the tumor tissue and stimulating cancer-cell growth, proliferation, invasion and migration. These processes are promoted by cancer cells through the secretion of neurotrophic factors, but also by the nervous system through the secretion of chemokines and neurotransmitters \cite{1,2}. In my research, I study the collaborative interactions between cancer and nerves and develop a new nanotechnology to treat cancer as a single or combined therapy. Nanotechnologies are becoming impactful therapeutic tools, granting tissue-targeting and cellular precision that cannot be attained using systems of larger scale. \textbf{We hypothesize that by reducing nerve ↔ cancer interactions via nanotechnology we will inhibit tumor growth and metastasis.} Our preliminary results show that cancer cells stimulate neuronal growth and that, in turn, neurons stimulate cancer cell proliferation and survival. Moreover, our nanoparticles are taken up by neurons efficiently. I aim to utilize this novel approach as a mean of targeting medicine to neurons, possibly also for treating other disease of the nervous system.
