



THE 2011 KIDS WALK HELPS FUND MSKCC'S EXCITING NANOPARTICLE PEDIATRIC CANCER RESEARCH

The proceeds of the 2011 Kids Walk for Kids with Cancer are supporting research at Memorial Sloan-Kettering Cancer Center under the direction of Dr. Nai-Kong Cheung, into a revolutionary new way to treat pediatric cancer--**delivering nanoparticle therapies to cancer cells using designer antibodies.**

Just as engineers have raced to shrink the size of transistors to make the next generation of high performance MP3 players and 3D plasma screens, biologists are building molecular machines that are on the nanometer (10^{-9} M) scale—i.e., thousands of times smaller than the diameter of a human hair. Physicist Richard Feynman described molecular machines with atomic precision in 1959, but it has taken decades to develop the ability to capitalize on these ideas. Today nanoparticles are rapidly becoming building blocks for new medical treatments. Nanoparticles can perform different functions based on how they are designed and programmed. When gathered as nanocrystals they will shine through tissues allowing precise medical imaging. They can be used as 'Trojan horses' with hidden ammunition made to penetrate cells and release a drug payload. As nanomagnets, these particles can use electrical fields to perform actions inside the body. Yet, using nanoparticles to target precise locations such as cancer cells is a biologic challenge yet to be resolved.

MSKCC researchers believe they may now have the potential solution, by using special designer antibodies to deliver nanoparticles to cancer cells. MSKCC will research and build these antibodies to deliver nanoparticles to neuroblastoma, sarcoma, and leukemia/lymphoma cells. Since nanoparticles can be made to multitask, researchers anticipate using them to deliver drugs, toxins, radiation, DNA, or RNA, packed together all at the same time. Not only can more potent radiation or other cancer-destroying agents be delivered selectively to each single tumor cell, but they are delivered in one-two-three punches, never allowing the tumor cell any chance to develop resistance, something near impossible with chemotherapy, ALK inhibitors, iodine-labeled antibodies or MIBG. While nanoparticles will initially be used as passive carriers, MSKCC researchers imagine the day when they can be made into nanodevices that can be controlled from outside the body for an extended period of time.

If these important experiments are successful, MSKCC researchers will be able to rapidly move nanoparticle-based therapies into the clinic to give childhood cancer patients new, less toxic and better-targeted treatment options. Nano technology is actively being pursued in all areas of medicine, but virtually all investigations have so far been directed at adult diseases. The Kids Walk is proud to support this exciting research with such great potential for children with cancer.



THE 2010 KIDS WALK HELPS MSKCC DEVELOP NEW ANTIBODIES FOR OSTEOSARCOMA, MELANOMA AND NEUROBLASTOMA

The proceeds of the 2010 Kids Walk for Kids with Cancer are supporting research at Memorial Sloan-Kettering Cancer Center under the direction of Dr. Nai-Kong Cheung, to develop a new generation of "anti-GD2" and "anti-GD3 monoclonal antibodies." The new antibodies are being designed to be more effective than current antibodies yet with even fewer side effects, and will be formulated into treatments against metastatic forms of neuroblastoma, melanoma and osteosarcoma.

More effective treatments are needed against the metastatic forms of these cancers, because they can be very difficult to cure. The average age of diagnosis is 2.5 years for neuroblastoma and 10-25 for osteosarcoma, with melanoma striking teens as well as adults. Moreover, children who have had aggressive treatments for pediatric cancer are at risk for developing second cancers including osteosarcoma and melanoma later in life.

First developed starting in the 1970s, monoclonal antibodies can bind to certain proteins on cancer cells and help the immune system identify and kill the cancer cells. Antibodies can also be used as a carrier to deliver a radioactive isotope or other drug directly to cancer cells, yet while sparing nearby healthy tissue. Thus, monoclonal antibodies offer an additional therapeutic approach to current cancer treatments, and have shown benefit in improving survival while having few or no long-term side effects. Dr. Cheung has been using monoclonal antibodies at MSKCC to treat children with neuroblastoma since 1987. Significantly improved outcomes have been seen at MSKCC in children with stage 4 neuroblastoma who have undergone antibody treatment in addition to completing frontline treatment. However, current antibodies are not achieving their optimal potential.

In the project that the Kids Walk is supporting, anti-GD2 and anti-GD3 (referring to the sugar substances on the cancer cells being targeted) antibodies will be made human or human-like, so as to be better tolerated than antibodies made in laboratory animals. The antibodies will also be genetically engineered to be more durable when injected in the body; to have increased precision in targeting cancer cells; and to better attract the body's own "warrior" white blood cells to fight the cancerous cells. Most importantly, the new antibodies will be developed into treatments that should be more effective with fewer side effects against neuroblastoma and metastatic childhood osteosarcoma and melanoma.

It is believed by the MSKCC researchers that the new generation of antibodies will bring about more cures in children, teenagers and young adults with these cancers. The Kids Walk is proud to help fund the development of this important new addition to the arsenal of pediatric cancer treatments.