Treating cancer without debilitating side effects

Heat-activated nanoparticles attack tumors ‘from outside in’

By Marie Powers

Triton BioSystems, Inc. (TBS) of Chelmsford, MA, plans to submit an application within a year to the U.S. Food and Drug Administration for phase I clinical trials of its targeted nanotherapeutics (TNT) system, which is designed to treat late-term breast and prostate cancer.

The TNT system represents a novel approach to attack cancer without the debilitating side effects or potential damage to healthy tissue from existing therapies, according to Samuel Straface, PhD, founder and CEO of the privately held company.

The TNT system uses a two-part process to attack cancer, Straface tells NanoBiotech News. First, the patient receives a simple infusion that contains trillions of bioprobes, or T-probes, each of which is a nano-sized magnetic sphere bound to an antibody. The antibody serves only as a navigation device, continued on page 4

Nano device maker predicts rapid sales increase from upsurge in nano activity

By Jane Anderson Cassell

BioForce Nanosciences, Inc.’s sales of its atomic force microscopy (AFM) product line boomed in January, leading company executives to say they hope the company could exceed 2003 sales by 400%.

CEO Laurence Russ told NanoBiotech News that January sales for this product line represented more than one quarter of total sales of 2003.

“We’re just starting now to really increase our promotional efforts.” Sales have been worldwide, and indicate to the company a very strong upsurge in interest in nanotechnology,” Russ says.

The growth in sales in the AFM Solutions line sets the stage for the company to launch its NanoArrayer, a nanoscale surface patterning instrument, and the ViriChip, a virus detection and identification product, later in 2004, says Russ.

AFM is used as an ultra-sensitive measurement of surfaces -- down to one molecule, says Russ. “If continued on page 5

Earlier controversy addressed: bacteria are causal

Study confirms Nanobacteria presence in human renal stones

By Steve Lewis

The findings of a new study appear to confirm earlier research by the co-founders of Nanobac OY which indicates the presence of nanobacteria in human renal stones.

Nanobac OY is now a wholly owned subsidiary of Nanobac Pharmaceuticals, Inc., (OTCPK:NNBP), of Tampa, FL. The study, published in Urological Research is compared to the earlier research by E. Plavi Kajander, MD, and Neva Ciftcioglu, PhD, co-founders of Nanobac OY.

The aim of the new study was to detect, isolate, and characterize the nanobacteria from human renal continued on page 5

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circulating through the body for several hours to several days and binding to chemical markers on the surface of tumor cells.

“In this application, the antibody simply serves as a GPS system,” Straface says.

Once the bioprobe has found and attached to their targets, a physician uses an external device to apply a focused magnetic field in the region of the cancer, which excites the nanoparticles. The resulting heat at the surface of the tumor compromises the cell membrane, destroying the cancer cell instantly.

The T-probes of the TNT system are not linked to toxins or radioisotopes, Straface points out. Their payload, the nano-scale magnetic particles, remains silent until selectively activated in the treatment zone. To enhance the safety of the therapy, TBS is selecting antibodies that are less cross-reactive and unlikely to bind to noncancerous tissues.

Over a period of days, the T-probes break down and are excreted from the body, thus ensuring a high level of selectivity within the treatment zone while minimizing collateral damage to healthy tissue throughout the body, Straface maintains.

More of a device than drug

“Unlike other therapies, the targeted nanoparticles attack from the outside in, so they don’t affect the neighboring cells,” he points out. “The TNT system operates more like a device than a drug.”

TBS, which is working with researchers at the University of Massachusetts in Lowell and other nearby institutions, is prepared to make that argument to the FDA. In fact, Triton’s nanomaterial is already approved as an MRI contract agent, and its nanomaterial coating is already in FDA use.

“There’s a clear advantage to being regulated as a device,” Straface tells NanoBiotech News.

“With a drug application, the complication is that the earlier stages of development, especially preclinical requirements, can be significantly different and more costly.

“Clearly, this system meets the definition of a device because you switch it on and off to heat the targeted nanoparticles,” he adds. “But the presence of a biological molecule complicates the situation. We’re talking to several biologics companies with antibody candidates that have been in human clinical trials and either have shown no therapeutic effect or have an antigen that fulfills our business plan objective.”

Triton expects to begin formal discussions with the FDA about its application within 90 days.

“Whether device or drug, at the end of the day the FDA wants guarantees that safety is assured,” Straface acknowledges.

Initial military application still be pursued

The technology underlying the TNT system was developed by Triton Systems, also based in Chelmsford, in partnership with the U.S. Army Research Lab, Weapons and Materials Directorate, as a prospective agent for improving battlefield repairs of military armor. Triton saw an opportunity to use its military nanomaterials for medical applications and launched TBS in 2000, though the two businesses operate as independent entities.

A military link has endured, however. Last month, Rep. Martin Meehan (D-MA) revealed that the U.S. Army’s Walter Reed Army Institute of Research will fund additional TNT research for use in Army medical facilities and hospitals worldwide.

“Companies like ours are too small and focused on product development to look beyond immediate applications,” Straface says. “This funding from the U.S. Army allows us to look at next-generation products, to investigate other solid tumors -- such as pancreatic, ovarian, and lung -- and to conduct testing that we could not do on our own.”

Seeking to raise $18

TBS, which merged operations with Minneapolis-based Theronix, Inc. in December 2002, has received more than $3 million from its founders and a handful of private investors, including Israel’s Millennium Materials Technology Fund. Presently, the company is seeking to raise $18 million in its first institutional financing round, which Straface expects to close by June 1.

The company holds a dozen patents or applications, both in the U.S. and globally through the Patent Cooperation Treaty, and Straface is eager to begin clinical trials and send the TNT system to the marketplace.

“Some development still is required to link the antibodies and the nanoparticles,” he says. “We have the technology inside to do that, but we’re open to collaboration -- especially on good manufacturing practice standards.”

Editor’s Note: Contact Samuel Straface at (978) 250-4200.