

Nanoprobes, Inc.

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Industry: Biotech

Management Team:

James F. Hainfeld, CEO, Princeton, BSE, U.

Texas, Ph.D. (Chemistry/Biochemistry), U

Chicago, post doc (Biophysics/Biochem)

Frederic R. Furuya, COO, Brown U., BS, U.

Minnesota PhD (Inorganic Chem)

Richard D. Powel, CRO, Imperial College, BSc,

Carnegie Mellon Ph.D. (Inorganic Chem)

Scientific Advisory Board

Henry M. Smilowitz, Reed College, AB, MIT,

PhD (Microbiol/Biochem), Tufts & Harvard

Medical Schools, post doc (Cell Biology)

TBA

Number of Employees: 10

Intellectual Property:

6955,639 & 7,367,934: Method of enhancing the effects of radiation with metallic nanoparticles, Exp: 2023.

7,906,147: Composition of matter: Metallic nanoparticles with bilayer coating, Exp: 2026.

0274101A1: iodine based particles, Patent Pending, Exp. 2036. Provisional applications covering additional embodiments, Exp: 2040. 25 issued patents.

Legal:

- Corporate: Nixon, Peabody
- IP: Wilson, Sonsini, Goodrich & Rosati

Grant Support: Nanoprobes Inc., \$17,000,000 in NIH, NSF, SBIR, STTR Funding. Henry Smilowitz, ~\$3,500,000 (Direct Costs) in NIH, Foundation and Corporate Funding.

Financing Sought: \$9.6M for:

INP scale up (\$500K)

Dog safety study (\$800K)

Further R&D (\$2.5M)

Dog Clinical Trial (\$1.5M)

Phase I safety clinical trial (\$3.3M)

Admin (1M)

Types Sought: Early Stage Investment, Strategic Alliance, Foundation support

INP-RT: Iodine Nanoparticle-Radiotherapy. To revolutionize efficacy of radiation therapy for cancer with a focus on Primary and Metastatic Brain Tumors.

History: Nanoprobes, Inc. researches and manufactures functionalized nanoparticles and associated materials that are used worldwide in studies ranging from single proteins to cells to animals as well as use in ultrasensitive immunological tests and the material sciences. Nanoparticles are also developed for novel diagnosis and therapy of diseases. Nanoprobes is a C corp. and has been in business for over 25 years (founded by J. Hainfeld 1990) with over 100 products and 30 worldwide distributors. It has received over \$17M in NIH/NSF federal grants and has 25 issued patents.

Opportunity: In the U.S. there are about 200,000 brain tumor cases per year and since there are few, if any, effective treatments, these tumors account for about 20% of all cancer deaths¹. Once cancers spread to the brain, the median survival is only 3 to 6 months². The standard treatment is radiation with steroids, but this provides only temporary abatement. Unfortunately, enough radiation cannot be given without damaging normal brain tissue. Effective treatment of brain tumors is therefore one of the most pressing unmet needs in cancer today.

The Breakthrough: Nanoprobes has developed iodine based nanoparticles (INPs) that target brain tumors, loading them with highly X-ray absorbing iodine. Upon irradiation, the iodine stops X-rays, generating electrons and free radicals that are deposited locally and damage the tumor. In this way, the dose is boosted up to 8-fold, just at the tumor, thus sparing normal brain tissue while delivering a severe blow to the cancer. In animal studies, with radiotherapy alone, all animals died by 72 days; INP pretreatment resulted in long-term remissions with 40% of mice surviving 150 days and 30% surviving > 280 days (half a mouse lifetime).

Products: Nanoprobes, Inc. has developed an Iodine Nanoparticle (INP) that is a 20nm polymer of triiodobenzene with PEG on its surface. It homes to tumors and increases radiation dose to the tumor—not to normal tissue. This technology can also be applied to other difficult to treat cancers.

Competition: TherAGuIX (Grenoble, France) has developed a gadolinium nanoparticle for radiation enhancement, but it does not highly load tumors. They are beginning clinical trials in Europe. NanoBiotix (France) uses direct tumor injection of hafnium NPs and is conducting clinical trials in Europe and the U.S. with head & neck cancer and sarcoma. Results do not show significant life extension. Polyqurum (PCIVentures) has developed gold nanoparticles that are somewhat biodegradable for presumed enhanced clearance, still Preclinical.

Financial Projections: Total market: 200,000 brain tumor patients/year X \$50,000 per patient = \$10B. Initial market: Projections based on 10% market penetration after 5 years. World market is about 4 times what is shown.

	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Revenue	\$50M	\$200M	\$600M	\$900M	\$1B
Profit	\$0	\$100M	\$500M	\$800M	\$900M
Gross Margin	0	50%	55%	60%	65%

¹<https://emedicine.medscape.com/article/1157902-overview#a5>

² Wanleenuwat, P. & Iwanowski, P.. J Neurol Sci 412, 116755 (2020).

¹ Yu J Transl Cancer Res.2013:384-396.