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Fight the Cancer, Not the Treatment

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Fight the Cancer, Not the Treatment
Heal the World, Great Problems Seminar, Worcester Polytechnic Institute
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Need
The need is to decrease or eliminate some of the physical, mental, and emotional traumas that accompany the treatment of cancer; these are symptoms that decrease the body’s ability to respond effectively and fight the cancer or to even survive the treatment.

Goal
Our goal is to present the most promising nanoparticle research, as it pertains to the delivery of cytotoxic and antineoplastic drugs. In doing this, we hope to raise the public awareness needed for companies to promote this treatment because anything that can be done to expedite the clinical trials is worth doing.

Current Obstacles
Time
- Must wait years to see what long-term effects of introducing nanoparticles into the body may be.
- It will still be a while until a completely successful process is developed.
- With recent statistics from the World Health Organization predicting that cancer will surpass heart disease as the most common killer in the world by 2030, time is of the essence in bringing successful treatments to the predicted 75 million people who will be living with cancer by 2030.

Money
- Research, testing, creation, and FDA approval process costs about $1 Billion.
- Constant funding from multiple outside sources is necessary.

Side Effects of Chemotherapy
- Thrombocytopenia (extremely low platelet count)
- Nose Bleeds
- Preparatory Blood Poisoning
- Neutropenia (low white blood cell count)
- Immune Deficiency
- Leads to Opportunistic Infections
- Dental Infections
- Fever
- Pulmonary-Fever syndrome: some on the brink of death
- Secondary Neoplasms
- Gastrointestinal Tract Problems
- Nausea
- Diarrhea
- Constipation
-卡Diabetes Mellitus
- Cardiovascular (hardening of the heart, death due to heart disease)
- Hepatitis (Liver Damage)
- Crohn’s Disease
- Rheumatoid Arthritis
- Skin rash
- Damage to lung tissue
- Immune Deficiency
- Accelerated cancer growth

How Nano Particles Work...
1. The nanoparticles are introduced into the body in a benign form.
2. Particles travel through the body.
3. The nanoparticles attach to Epidermal Growth Factor Receptors (EGFR) found on most cancer cells.
4. Once attached, the nanoparticles release their drug payload, directly killing the cancer cells.

Polymer Nanoparticles
Made out of various types of polymers. Easily produced. One method of production called PRINT (Particle Replication in Non-Wetting Templates) technology involves molds made from silicon templates. The ability to create these molds in any shape allows the polymer nanoparticles to be produced in any shape. This easy and flexible production is a huge benefit to using polymer nanoparticles.

Gold Nanoparticles “Nano-gold”
- Clusters of gold atoms that are usually less than one-hundred nanometers in diameter.
- Been used in medical procedures for over fifty years including the treatment of rheumatoid arthritis.
- FDA approved for other uses in the body.
- Biocompatible – not toxic to human tissues or cells.
- Can move safely through the bloodstream, and is not rejected by the body.
- Relatively easy to stretch and shape.
- More expensive than the other materials.
- The company, CytImmune Sciences Inc., is working with nano-gold, and has shown that it can safely attach anti-cancer drugs to its surface and travel through the bloodstream.
- Went through Phase 1 of clinical trials and had some success.

Future
In a world where “40.35% of men and women born today will be diagnosed with cancer... at some time during their life” the existence of a drug with the ability to target and kill cancer cells while ignoring healthy cells would be a valuable asset. If this technology could be perfected its applications would be limited only by the creativity of the medical community. Only time will determine whether this revolutionary new technique is as promising as current studies would indicate.

Action Plan
- With the information we obtain, we plan to develop an informational pamphlet about this new drug delivery system, since the general public is largely unaware of its potential.
- It is our intention to distribute this information at various audiences.
- We also plan on attending as many Relay for Life events as possible to connect with people and share the this information with interested parties.

Work Cited: