esnanotechnology
DEVELOPMENT LIMITED

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Advanced Drug Delivery Systems That Reduce Collateral Damage

Traditional radiotherapy and chemotherapy are used on over 6 million patients every single year, up to 60% of all cancer patients worldwide. Nevertheless, despite its common usage there are massive issues concerned with the damage these therapies do to healthy tissue throughout the body.

We believe that we have what could be an exciting answer to this problem, NanoMedicine.

About Us

What We Do?

We are committed to our research into nanotechnology and nanomedicine and what it can do to fight cancer. At the moment 1 in 4 deaths in the developed world can be attributed to cancer, after cardiac arrest it is the second biggest killer.

ESNano Technology Development Limited is using nanotechnology to develop groundbreaking technologies and medicine to provide advances in the following areas:

Medical Imaging
Drug Delivery
Cancer Therapy

Tackling Cancer

Cancer is a major cause of death in the developed world and is now becoming the leading cause of mortality in the developing world.

Traditional radiotherapy and chemotherapy are used on over 6 million patients every single year, up to 60% of all cancer patients worldwide. Nevertheless, despite its common usage there are massive issue concerned with the damage these therapies do to healthy tissue throughout the body. This often results in some serious side effects, which can have a detrimental effect on the quality of patient life.

At ESNano Technology Development Limited we believe that we have what could be an exciting answer to this problem, nanomedicine.

Treating Brain Cancer

When treating brain cancer we need to be extremely careful. The brain is still a huge mystery to medical science, so when it comes to treating a tumor in the brain we must proceed with care. Whenever a patient is shown to have brain cancer the biggest problem we face is how to treat such a delicate organ and to avoid damaging healthy brain tissue as much as possible. In fact what we are doing when treating any brain cancer is destroying brain cells that has become diseased and changed into cancerous cells. Therefore, no matter what the traditional method of treatment is implemented there is going to be damage to healthy tissue and the side effects that this can cause.

It is our aim to develop a system, which targets only the diseased tissues. Hopefully this will limit damage done to healthy brain tissue. We believe that NanoMedicine is the answer, we have designed a nano-sphere coated in a layer of gold 1 atom thick. We can attach to the gold specific biological molecules that will recognize proteins expressed on the surface of cancer cells. Because these proteins are not expressed on healthy cells, the idea is to use these to target diseased cells only. At ESNano Technology Development Limited, we have demonstrated how we can target cancerous cells in vivo (live experiments). We propose attaching molecules for imaging to help diagnose cancer and to attach therapeutic molecules to treat the cancer.

In effect what this means is a kinder way to treat brain cancer. There is no need to poison healthy tissue in the traditional slash and burn approach to treating any cancer. This will significantly reduce side-effects leading to a much better quality of life both during and after treatment.

Solutions

Cancer Therapy

A novel approach

Here at ESNano Technology Development Limited we have made significant steps forward to producing an exciting and novel method for treating cancer. We have specialized in treating brain tumors as these forms of cancer has always presented very serious problems when it comes to treatment and any operation upon the brain is a very serious situation indeed.

In the past traditional treatment with chemotherapy had come up against one of biology's great developments, the blood brain barrier. Getting past this barrier has traditionally been one of the greater difficulties in delivering therapeutic treatments. The blood brain barrier (BBB) carries out a neuron-protective role. Methods traditionally used are complicated and expensive and sometimes even require direct intra-cerebral implantation by needles into the brain itself.

A complete system

ESNano Technology Development Limited research has yielded some exciting results in crossing the BBB in both imaging, diagnostic and in treatment therapies. Nanotechnology has once again delivered the prospect of a MagicBullet in the treatment of cancer. ESNano Technology Development Limited has shown that these nano-spheres can be coated with a layer of gold 1 atom thick. Attached to the gold are radioactive isotopes capable of emitting the type of radiation, beta particles, needed to kill tumor cells. Beta particle decay is in the form of high-energy electrons, which will be given off as the radioactive isotope decays.

Patient safety a major priority

One concern patients may have is the presence of radioactive particle in their body, however our researchers have determined that these nano-spheres introduce significantly less radioactive compounds into the body than something familiar like a barium drink used in observing the digestion tract with x-rays. ESNano Technology Development Limited researchers have worked out the optimal safe parameters for the cancer killing golden nano-spheres. Each treatment deploys the right level of radioactivity to kill the tumor cells and will exhibit a short enough half-life to ensure that healthy tissue does not feel any significant effects.

Drug Delivery

Crossing the Blood Brain Barrier

ESNano Technology Development Limited is developing systems designed to identify and treat brain tumors. One of the greatest problems in treating the brain is crossing the Blood Brain Barrier (BBB).

What is the Blood Brain Barrier?

The Blood Brain Barrier (BBB) is an anatomic-physiologic feature of the brain. The BBB is thought to consist of walls of capillaries in the central nervous system and surrounding glial membranes. The BBB separates the nervous tissues of the central nervous system (spinal cord and brain tissue) from blood. The blood-brain barrier prevents or slows the passage of some drugs and some chemical compounds and disease-causing organisms such as viruses from the blood into the central nervous system.

Drugs designed to target the brain

ESNano Technology Development Limited has spent a number of years developing a complete therapeutic system designed to identify and treat brain tumors. We knew of the difficulties encountered in delivering therapeutic agents to specific regions of the brain. This major challenge to treatment is a serious problem in the treatment of brain disorders. The Blood Brain Barrier (BBB) provides the function of protecting the brain from foreign particles, including bacteria and viruses. A side effect of this function, and one that hinders modern medicine, is that it also protects the brain from therapeutic medicines by inhibiting or even preventing their transit across the BBB.

Nanotechnology has the answer

ESNano Technology Development Limited believes that today's advances in nanotechnology have provided the answer. Our research has produced some exciting results in getting both imaging markers and therapeutic agents across the BBB. We believe we have developed a groundbreaking technology that is also incredibly safe to administer to patients.

Significant amounts of research have taken place in this area of nano-sphere mediated delivery. Delivering drugs across the BBB will be one of the most promising applications of nanotechnology in clinical neuroscience. ESNano Technology Development Limited feel that nano-particles like our golden nano-spheres have massive and exciting potential to carry out multiple tasks in a system of identifying and then treating tumors and other brain or neurological disorders.

Medical Imaging

Groundbreaking technology

Researchers working with ESNano Technology Development Limited are working on a groundbreaking technique to help highlight tumors. Using the golden nano-spheres we have designed we are able to target cancer metastasis in the body. The golden nano-spheres are gold-coated balls of carbon 60, better known as buckyballs. The gold surface then has the specific cell-targeting compound attached to it, the compound is designed to target the cancer cells being looked for. There are different targeting compound that correspond to different cell markers that are only found on particular cancer cells.

The detection occurs by using low-level radiation emitted by lasers onto a patient. Normally gold in large quantities can be toxic inside the body. However, research has now shown the small amount of gold associated with the nano-particles is less toxic than traditional imaging compounds used.

Cost effective imaging

The synthesis of the golden nano-spheres is a simple and very cost effective process. The whole process can be carried out at room temperatures. The end product is also environmentally friendly and there are no harmful waste products produced, in fact all materials are easily recycled and re-introduced into the system.

Studies have shown that the golden nano-spheres are useful in both imaging diagnosis and treatment of cancers. The system can be used to carry both imaging indicators and as a therapeutic delivery vector.

Diverse Product Development

We believe that our nano-sphere system will provide a complete system that can be used from start to finish in patient care: It is a diagnostic imaging tool and it provides the system to deliver therapeutics needed for treatment.

We believe that in the future with further development that this delivery system to recovery will lead to treatments for other disorders, diseases and damage to the brain where our technology will provide the perfect delivery system.

A world of possibilities opens up to us by providing an exciting way to delivery therapeutic treatments to brain neurons without the need to perform invasive and possible life altering brain surgery. One that may even help us to finally understand one of biology's last great mysteries, the workings of the human brain.

Other potential treatments could involve the following:

Alzheimer's Disease
Aneurysm Repairs
Brain Trauma
Brain Tumors and Cancers
Cerebral Palsy
Coma and Persistent Vegetative State

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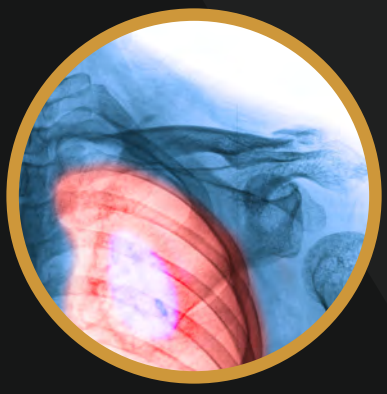
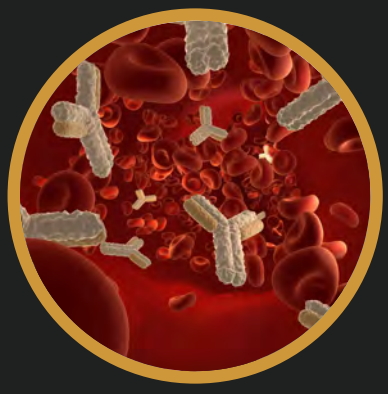
The possibilities could be endless, our system paves the way forward to a future where we can provide easy access to imaging in the brain and also a way of delivering medicines or even possible gene therapies directly into the brain just where it is needed and to cause as little damage to healthy neurons as possible.





Lab Results

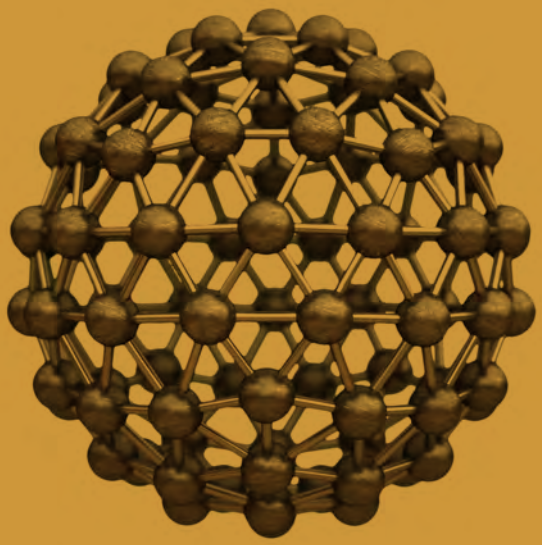
ESNano Technology Development Limited Successfully Target of Brain Tumor Cells in Mice.

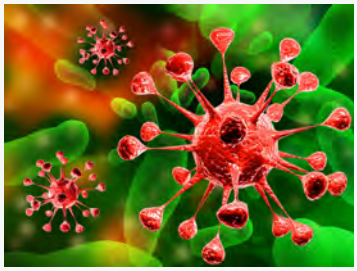
Here at ESNano Technology Development Limited our research teams have spent the last 18 months performing a series of experiments in the proof of concept stage for our system. We have proposed a system, which can be used to identify cancerous cells and then used as a delivery system to treat diseased cells.

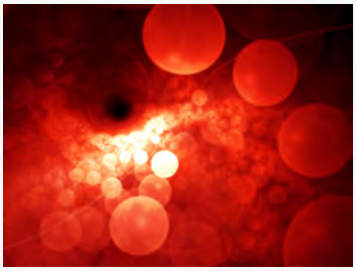
18 months ago, we started with a series of in vitro experiments. This is where the test procedures are carried out in a test tube or culture dish (these initial experiments are not carried out within a living system). After 6 months of experimenting our researchers found the initial results of the experiments and testing had produced promising and exciting results.

We were able to move onto the next phase of development, in vivo experiments, where 'living tissue' is experimented upon. We started in a set of simple tissue culture experiments before moving onto experiments with mice. This is a stage we had to carry out in vivo due to the complex nature of the way capillaries, which carry oxygenated blood into the brain form what is known as the Blood Brain Barrier (BBB). These capillaries unlike those found in other parts of the body only allow for the exchange of the smallest of molecules, such as the exchange of oxygen and carbon dioxide in the brain. The BBB has presented a significant obstacle in getting therapeutic agents into the brain tissue, as they are often too large to cross the BBB.

We attached imaging molecules to the gold nano-spheres we have developed. Our team of research scientists was then successfully able to show precisely where the tissues they were looking for are. We are now ready to move into the final phase of development by developing gold nano-sphere, which are capable of carrying the right amount of therapeutic agent to treat the tumor cells successfully and with the eradication of dangerous brain surgery usually associated with brain tumors. On the completion of these experiments, we will apply to carry out clinical trials.







Vision

NanoMedicine

Essentially NanoMedicine is the application of nanotechnology in the medical field. NanoMedicine is used to describe the highly specific use of structures on the nano-scale in the treatment of diseases right down to the molecular level. NanoMedicine is also used in diagnostic procedures and can be found in a variety of modern imaging techniques used to diagnose and to provide prognosis of a patient.

Here at ESNano Technology Development Limited we are working with researchers on developing some very exciting new techniques, which are designed to take advantage of the latest research coming out of nanotechnology today. Technologies that are being used to design new methods to treat a plethora of disorders. At this time the biggest and most exciting area is the research being carried out into specific drug delivery systems ones where we are looking to targeted drug delivery.

NanoMedicine is the next major advancement in modern medicine development. NanoMedicine will allow for treatment of serious disease to be as non-invasive as possible, while at the same time only targeting those parts of the body that need targeting. Cancer tumors will no longer need dangerously invasive surgeries or highly toxic chemotherapies (with all the associated side-effect it brings) to remove them. We will be able to specifically target them without damaging surrounding tissue.

21st Medicine

NanoMedicine will change the way we look at and manage disease. There will be a new paradigm in medicine, a revolution in treating illnesses.

At ESNano Technology Development Limited we know that there are still significant obstacles that we need to negotiate with before the shift in paradigm happens. Nevertheless, every day new nanotechnologies are appearing with exciting new prospects that can to the uninitiated appear overwhelming and complex.

NanoMedicine will provide new paths for us to go down. Right now, many medical conditions require surgery and often it is inevitable. However, there are serious risks involved in any surgery. In fact, the truth is that no surgery is ever truly straightforward and safe. Many patients who undergo complex surgeries can experience complications or a reduction in their quality of life.

With the development being made in nanotechnology, it may soon be possible to treat many diseases with non-invasive techniques. ESNano Technology Development Limited is currently in the later stages of development of just such a treatment. The treatment of tumors with reductions in side effects caused by developing a targeted system of drug delivery. Old chemotherapy techniques are the equivalent of carpet-bombing the body to kill an elusive enemy. You cause as much damage to healthy tissue as you do to cancerous tumors, resulting in unpleasant side effects.

If NanoMedicine goes on to achieve just a fraction of what it promises we will see a new era of health care ushered into common usage. NanoMedicine could provide a new era of human longevity and prolonged health.

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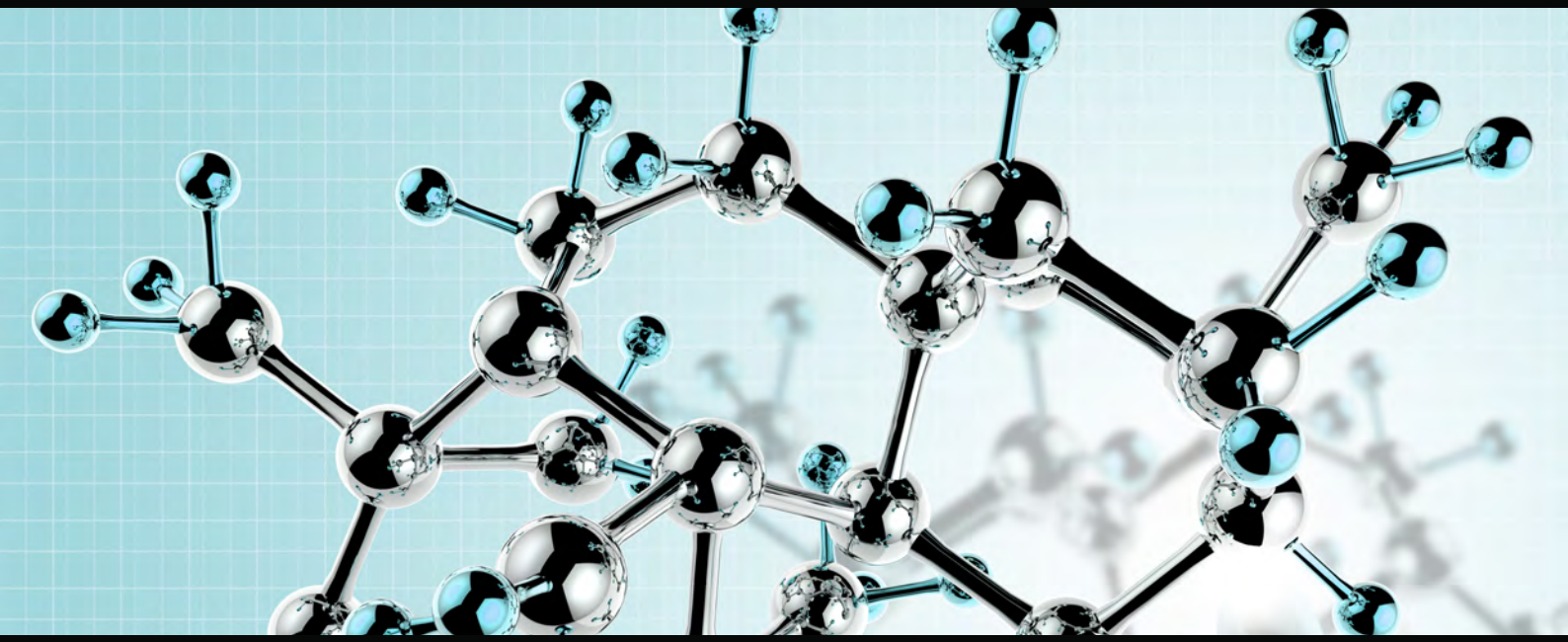

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