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Global Microbots Drug Delivery Advances, Therapeutic Applications & Opportunity Insight 2025

https://marketpublishers.com/r/G1BEF58DE71EN.html
Date: April 2019
Pages: 120
Price: US$ 3,000.00 (Single User License)
ID: G1BEF58DE71EN

Abstracts

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'Global Microbots Drug Delivery Advances, Therapeutic Applications & Opportunity Insight 2025' Report Highlights:

Overview of Microbots

Real Life Application of Microbots

Microbots: Application In Medicine & Biotechnology

Need of Microbots : Thrust To Targeted Drug Delivery Mechanism

Technological Advancement in Medical Microrobotics

Microbot Drug Deliver by Indication/Therapy: Cancer, Stem Cell Therapy, Blood Circulatory System, Neurological Problems & Others

'Global Microbots Drug Delivery Advances, Therapeutic Applications & Opportunity Insight 2025' report gives comprehensive insight on various issues involved with the research, development and commercialization of microrobots for the application of targeted drug delivery. Report highlights on going advancements in the field of medical microrobots and their relevance with respect to multiple indication and therapies.

Medical robotics is a very promising new branch. It is a field that uses tiny robots to

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travel inside a patient and carry out surgery, diagnosis or drug delivery. They would have the highest scientific and societal impacts on healthcare and bioengineering applications. Milli/submilli/ micro robots are the best alternative to existing medical devices (flexible endoscopes and catheters), mobile medical milli/microrobots has the ability to access small and complex regions of the human body like blood capillaries, gastrointestinal (GI), brain, spinal cord and inside the eye while being minimally invasive. Through microrobots it is possible to access unprecedented sub millimeter size regions inside the human body which has not yet been possible by any conventional medical devices.

The most promising application of microrobots in biomedical field is for targeted drug delivery which allows doctors to inject or dispense drugs to specific or hard-to-reach areas in the body that need them. Targeted therapy boosts the concentration of therapeutics, for instance, drugs, proteins, genes, mRNA, stem cells, radioactive seeds and imaging contrast agents in a specific targeted site inside the body while keeping the side effects to a minimal level in rest of the body. Furthermore, microbots can be controlled by the clinicians which help them control the release kinetics of the drug and modulate the concentration at the therapeutic window. This adjustment would lead to prolong effect of single dose administration at the targeted region.

All the traditional methods of treatment that are presently used don’t have the potential to reach some of the inaccessible places in the human body. So whenever there is some problem in the hard-to-reach places of the body it is always a guesswork, for instance brain or neurological related concern. Even though there are advanced technologies like CT scan and MRI, these technologies provide only few images of the problematic zone in the brain but nothing concrete. There are still no technologies which can penetrate the blood brain barrier and perform a diagnosis.

Microrobots have lot of advantages in the biomedical field due to its miniature structure. It has the ability to go inside the body and reach inaccessible places and collect tissue samples to further analyze. For conducting biopsy with microrobots, especially for bone marrow biopsy or bone biopsy, there is no need for the patient to go through surgery. Also it is much less painful. In prostate biopsy with needles, multiple needle biopsies are taken at one time from the prostate gland. Sometimes to reach the prostate, a probe is inserted into the rectum. While microbots are so tiny there is no need for these painful procedures. Microbots go to the targeted site, grab onto tissue sample and taken out of the body.

In the near future microbot will definitely occupy the targeted drug delivery and

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minimally invasive surgery arena. As these are the most sought for and demanding line of work. Targeted drug delivery and minimally invasive surgeries will not only be less painful for the patient but will also help in cutting the healthcare expenditure. This will definitely draw the attention of the government towards the usefulness of microbots and more grants may be released for R&D on microrobotics.

Also, with growing research and development larger companies working on robotics will bend towards the medical use of the microrobots, hence providing institutes with funding to continue their research to better their product. In this fast forward and technologically driven era, microbots are meant to be the future answer to the medicinal queries and distress. With minimally to non- invasive surgeries it will be easy to treat any age of patient with complicated health conditions also. At present the microbots might be going through rough patch but it will slow transition into the best treatment method.

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