

# 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

Please note: extra shipping charges are applied when purchasing Hard Copy License depending on the location.

'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

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

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.

## Contents

### **1. OVERVIEW OF MICROBOTS**

- 1.1 Introduction to Microbots
- 1.2 History & Evolution of Microbots

### **2. DESIGN OF MICROBOTS**

- 2.1 Design
- 2.2 Control

### **3. ACTUATION OF MICROBOTS**

- 3.1 Electromagnetic Actuators (EMA)
- 3.2 MEMS Based Magnetic Actuator

### **4. MICROBOTS WORKING MECHANISM**

### **5. REAL LIFE APPLICATION OF MICROBOTS**

- 5.1 Snake-Like Microbot
- 5.2 SWARM
- 5.3 Harvard's Ambulatory Micro Robot (HAMR)
- 5.4 Microbees
- 5.5 ViRob
- 5.6 Micro-Scallops

### **6. MICROBOTS: APPLICATION IN MEDICINE & BIOTECHNOLOGY**

- 6.1 Disease Diagnosis/Imaging
- 6.2 Telemetry
- 6.3 Targeted Therapy
  - 6.3.1 Drug Delivery
  - 6.3.2 Brachytherapy
  - 6.3.3 Hyperthermia & Thermoablation
  - 6.3.4 Stem Cell Delivery
- 6.4 Minimally Invasive Surgery
- 6.5 Tissue Engineering

6.6 Cell Manipulation

6.7 Wound Healing

6.8 Material Removal

6.8.1 Ablation

6.8.2 Biopsy

6.9 Controllable Structures

## **7. NEED OF MICROBOTS : THRUST TO TARGETED DRUG DELIVERY MECHANISM**

## **8. TECHNOLOGICAL ADVANCEMENT IN MEDICAL MICROROBOTICS**

8.1 Microtumblers ( $\mu$ TUMs)

8.2 Photolithography

8.3 3D Printing Techniques

8.4 Biocompatible & Biodegradable Materials

8.5 Wireless communication

## **9. MICROBOTS: CANCER TREATMENT**

9.1 Drug Delivery to Tumor Cells

9.2 Minimally Invasive Surgery in Cancer Treatment

## **10. MICROBOTS IN OPHTHALMOLOGY**

10.1 Drug Delivery Using Microbots

10.2 Microrobots For Minimally Invasive Intraocular Therapies

## **11. MICROBOTS IN BLOOD CIRCULATORY SYSTEM**

11.1 Drug Delivery to Arteries via Microbots

11.2 Minimally Invasive Cardiovascular Surgery

## **12. MICROBOTS: TREATMENT & DIAGNOSIS IN GASTROINTESTINAL TRACT**

12.1 Drug Delivery in GI Tract through Microbots

12.2 Diagnosis of GI Tract Using Microbots

12.3 Minimally Invasive Surgery in GI Tract

## **13. MICROBOTS IN TREATING RENAL AILMENTS**

13.1 Targeted Drug Delivery Inside Renal System

13.2 Microbots Assisting Renal System Imaging

## **14. MICROBOTS INSIDE THE EAR (HEARING RESTORATION)**

## **15. MICROBOTS FIXING NEUROLOGICAL PROBLEMS**

15.1 Self Cleaning Shunt: Treating Hydrocephalus

15.2 Drug-Delivering Microbots To Treat Lacunar Strokes

## **16. MICROBOTS: CARRIER OF STEM CELLS**

## **17. MICROBOTS IN DRUG DELIVERY**

17.1 Locomotive Drug Delivery Particle

17.2 Different Modes Of Microbot Drug Delivery

## **18. GLOBAL MICROBOT DRUG DELIVERY MARKET DYNAMICS**

18.1 Driving Force for Microbot Research

18.2 Microbot Drug Delivery Market Challenges

## **19. INTELLECTUAL PROPERTY & COMMERCIALIZATION**

## **20. FUTURE OF MICROBOTS IN MEDICINE**

## List Of Figures

### LIST OF FIGURES

- Figure 1- 1: Evolution of Microbots
- Figure 2-1: Major Functions of Microrobots
- Figure 2-2: Main Approaches Of Designing, Building & Controlling Microrobots
- Figure 2-3: Examples of On-Board & Off-Board Approaches to Mobile Microrobot Actuation & Control in 3-D
- Figure 2-4: Microbots Classification On The Basis Of Material
- Figure 3-1: Actuators Used In Microbots
- Figure 3-2: Different Types of Actuation Approaches
- Figure 4-1: Locomotion of Microbots Inspired By Microorganisms
- Figure 4-2: Approaches to Mimic Bacterial & Eukaryotic Flagella In Microbots
- Figure 5-1: Timeline Showing the Microrobot Systems, 1996-2014
- Figure 6-1: Applications of Microbots in Biomedical & Bioengineering
- Figure 6-2: Microbot Used As Telemetry
- Figure 6-3: Potential Application of Targeted Therapy by Microbots
- Figure 6-4: Targeted Drug Delivery by Microrobotics Swarm
- Figure 6-5: Applications of Microrobotics Cell Application
- Figure 6-6: Material Removal by Microbots
- Figure 6-7: Microbots: Possible Uses as Controllable Structures
- Figure 8-1: Types of 3-D Bioprinting Technologies Based On Working Principle
- Figure 8-2: Steps of 3-D Bioprinting Process
- Figure 8-3: Concept of Magnetic Actuated Drug Delivery
- Figure 9-1: Process of Microbot Drug Delivery for Cancer Treatment
- Figure 9-2: Making Of Magnetized Spirulina for Treating Cancer
- Figure 10-1: Ocular Disposition of Topically Applied Formulation to the Eye
- Figure 11-1: Cage Shaped Microbot in the Utilization of Drug Delivery System
- Figure 11-2: Difference between angioplasty & microbot assisted surgery
- Figure 12-1: Challenges in Delivering Drug to GI Tract
- Figure 15-1: SCS Ability to Prevent Blockage on a Shunt Opening (%)
- Figure 15-2: Advantages of SCS
- Figure 15-3: Advantages of Drug-Delivering Microbots to Treat Lacunar Strokes
- Figure 16-1: Use of Microbot in Stem Cell Delivery
- Figure 17-1: Objectives for Drug Delivery Particles
- Figure 18-1: Drivers of Microbot Research
- Figure 18-2: Unique Multivalent Functionalities of Microbots

## I would like to order

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

Product link: <https://marketpublishers.com/r/G1BEF58DE71EN.html>

Price: US\$ 3,000.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

[info@marketpublishers.com](mailto:info@marketpublishers.com)

## Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/G1BEF58DE71EN.html>

To pay by Wire Transfer, please, fill in your contact details in the form below:

First name:  
Last name:  
Email:  
Company:  
Address:  
City:  
Zip code:  
Country:  
Tel:  
Fax:  
Your message:

**\*\*All fields are required**

Customer signature \_\_\_\_\_

Please, note that by ordering from marketpublishers.com you are agreeing to our Terms & Conditions at <https://marketpublishers.com/docs/terms.html>

To place an order via fax simply print this form, fill in the information below and fax the completed form to +44 20 7900 3970



