

**Part 1** (8 points, 1 point per item). You are going to read an article about new discoveries in medical science. For questions **43–50**, complete the answers by inserting no more than **one** word from the text. There is an example (0).

### **TINY ROBOTS COULD BE DISEASE-FIGHTING MACHINES INSIDE THE BODY**

You can call it another case of science fiction becoming a scientific fact. Researchers have long dreamed of developing tiny robots moving inside our bodies, delivering drugs with precision, and destroying cancer cells. We're not there yet, but we're getting close.

This year a team of scientists from China and the USA said they had developed tiny robots just a few hundred nanometers in length. When researchers injected them into the bloodstream of mice, the nanorobots could shrink tumors\* by blocking their blood supply. Most cancer drugs typically have nasty side effects because they can't distinguish well between cancer cells and healthy ones. The researchers showed that the nanorobots only attacked the tumors and didn't affect cells elsewhere. They say this looks promising for cancer treatments free of side effects, and this is just a taste of what these nanorobots could do. Soon scientists will demonstrate even more scenarios for nanorobots. In addition to boosting the effectiveness of powerful drugs, nanorobots could act as early warning systems for disease. Also, tiny wireless surgical tools could let doctors perform medical procedures without cutting people open. Instead of having an open wound, doctors would be able to inject surgical tools. So surgeons could do non-invasive procedures with no external cuts and without the complications that come from surgery.

Such nanorobots are very different from the human-size robots that build our cars or vacuum our floors. Still they are able to sense their environment, navigate, and carry out mechanical tasks just like large robots. The idea of tiny disease-fighting machines working inside the human body can be traced back to the 1966 movie "Fantastic Voyage," in which a ship and its crew were shrunk down and injected into a scientist's body to remove a dangerous blood clot. In real life, of course, it's not so easy to shrink machines. Computer chips, electric motors, and batteries are typically too large to function in blood vessels or between cells. But being able to access hard-to-reach areas of our bodies could have clearly positive consequences for medicine, so scientists are working hard to find ways to build and control inside-the-body robots.

Meanwhile, other researchers are looking for ways to exploit the activities of nature's own tiny machines. Rather than build a functional robot from scratch, they set out to experiment with smart materials in nature. For example, a team from Canada hijacked bacteria that naturally swim along magnetic field lines, loading them with cancer drugs in artificial conditions to bring them to tumors in mice. Eventually, building robots from scratch will give us much greater control over their functionality. But the science is still a long way from being able to mimic nature's innovations, so for now, these bio-hybrid approaches are a smart idea. They offer much more functionality than the machines we can build today.

It's still early days for these robots. Rigorous clinical trials need to be undertaken to ensure that having been inserted into the body, they either degrade naturally, or else they can be removed after finishing their task. However, their prospects are looking bright.

### SUMMARY

Researchers have dreamed for a long time about using tiny robots to improve the (0) *precision* of many medical procedures, such as administering drugs. Now scientists seem to be rather (43)

\_\_\_\_\_ to creating such robots. Already tested on mice, these robots can (44) \_\_\_\_\_ between affected and healthy cells. This means they can destroy tumors without attacking or damaging healthy cells which are (45) \_\_\_\_\_ in the body. From administering harmful drugs to performing complex surgeries, these tiny machines can become invaluable (46) \_\_\_\_\_ for doctors.

The idea of nanorobots is not new, but they have always been challenging to build because they have to be tiny in order to (47) \_\_\_\_\_ inside the body. Another option is to exploit organisms that already exist in (48) \_\_\_\_\_ to carry out the tasks that we need. For example, researchers can take existing bacteria and use their natural properties in artificial (49) \_\_\_\_\_. While these robots still have to pass a series of (50) \_\_\_\_\_ tests before we can use them with human patients, it seems to be a very promising line of research.