

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Please translate the following paragraph into Chinese. (50%)

There are several main subfields within cell biology. One is the study of cell energy and the biochemical mechanisms that support cell metabolism. As cells are machines unto themselves, the focus on cell energy overlaps with the pursuit of questions of how energy first arose in original primordial cells, billions of years ago. Another subfield of cell biology concerns the genetics of the cell and its tight interconnection with the proteins controlling the release of genetic information from the nucleus to the cell cytoplasm. Yet another subfield focuses on the structure of cell components, known as subcellular compartments. Cutting across many biological disciplines is the additional subfield of cell biology, concerned with cell communication and signaling, concentrating on the messages that cells give to and receive from other cells and themselves. And finally, there is the subfield primarily concerned with the cell cycle, the rotation of phases beginning and ending with cell division and focused on different periods of growth and DNA replication. Many cell biologists dwell at the intersection of two or more of these subfields as our ability to analyze cells in more complex ways expands.

2. Please write down your opinions about the following article in English or Chinese. (50%)

A new study from a group of researchers at the California Institute of Technology (CalTech) in Los Angeles looked at mice that have been genetically engineered to develop some of the changes in the brain and symptoms that are linked to Parkinson's disease. This includes the build up in the brain of a sticky protein called alpha synuclein into lumps called Lewy bodies, and the death of cells in a bit of the brain called the substantia nigra (which is important for controlling movement). When this happens in humans, it causes the symptoms that we associate with Parkinson's, such as shaking or slowed movement. The team at CalTech found that changing the number and type of bacteria in the gut of these mice could influence what happened in the mouse brain.

They used antibiotics to get rid of most of the bacteria in the gut of the mice, or used mice that don't have any bacteria in their stomachs at all. In these mice, they found that accumulation in the brain of alpha synuclein was decreased. They also found that there was less of an immune response in the brain, and that the mice had fewer problems with their movement.

Intriguingly, this isn't the first time that links between the brain and the stomach have been reported in Parkinson's. One of the first symptoms of Parkinson's disease is constipation, which doctors think is caused by the brain cells that control bowel movement dying or going wrong. Another link, which might be important for the experiments from the Californian group, is that the build up of the sticky alpha synuclein lumps that are linked to cells dying in the brain doesn't start in the brain. It starts in the gut and appears to spread to the brain later.