Nowadays, medicines are transforming from small molecules to larger and more complex molecules, even biological treatments. There are several reasons for this transform: more complexed medicines can make treatment more targeted, decreasing side-effects, and these complex medicines such as some engineered bacteria can have more room for improvement.

These complex medicines can also treat for a wide range like cancer, inflammation, disease of immune system, so these medicines are capable to make lots of profits. However, there are a number of difficulties for biological medicines. These medicines not only have pretty high prices but also are hard to mass produce. What’s more, some of these medicines cannot store for a long time. Therefore, there is high risk of investment on this industry.

Certainly, there are some solutions for these disadvantages such as increasing productions yields in bioreactors using microorganisms, reducing the time and cost associated with the slow growth of mammalian cells, and assisting on the optimization and engineering of biologics thanks to the high cloning capacity of microorganisms and the efficient screening methods of microbial libraries. So base on these solutions, biological engineering has made great progress.

Abstract: From marine *Shewanella species*

Introduction: Metabolism, immune and brain function could be influenced by colon.

The environment of gut can make it(what?) work harmoniously. However, if the environment or microbiota activities are changed, this situation may increase the risk of inflammation, cancer and depression. Because the gut environment is so complex and the inaccessibility to construct realistic gut models, the processes which are working in gut remain few understood.

Some bacteria have ability to sense some gut-relevant molecules.

There were three studies which use gut adapted bacteria to express chromo protein or GFP when its senses some change. By oral gavage of mice, these bacteria can detect some particular chemicals in mice’s gut. However, the result of these studies is not ideal. And there is another study. Although the sensor bacteria were 6designed to measure host fucose levels, it does not work. From these previous studies, it can be concluded that there are two main challenges which are making sure that the engineer bacteria can work in the gut and how to get a expression from testing organism and keep it microbiota intact