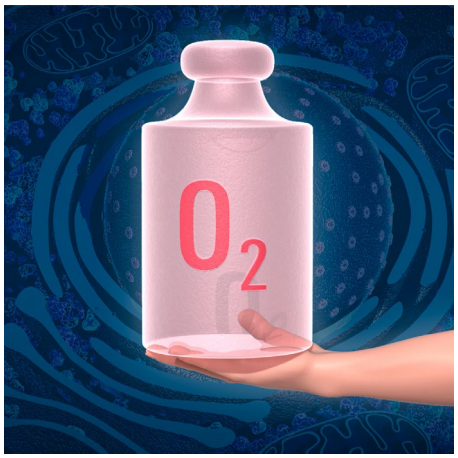
THE NOBEL PRIZE

Student Worksheet – 2019 Medicine Prize
How cells adapt to oxygen availability



We need oxygen from the air in order to stay alive. All the cells in our bodies require oxygen so that they can convert food into energy. **William G. Kaelin Jr, Sir Peter J. Ratcliffe and Gregg L. Semenza** have discovered how cells adapt to increased or decreased amounts of oxygen in the body.

The oxygen levels in the body can sometimes change. When we strain our muscles or if we are high above sea level, oxygen availability may be lower than normal. When oxygen levels change, our cells must adapt. Thanks to research by the 2019 Laureates in Physiology or Medicine, today we know how this vital adaptation process occurs. The Laureates found out what chemical reactions take place inside of cells, what substances are involved and how they affect each other.

The Laureates discovered that a particular protein plays a crucial role for oxygen sensing in cells. This protein is called "hypoxia-inducible factor 1 alpha" (HIF-1α). When cells receive too little oxygen, they require more HIF-1α. When there is too much oxygen in cells, the amount of HIF-1α is instead reduced.

Oxygen sensing in our cells may play an important role in certain disease, for example anaemia, cancer and myocardial infarction (heart attack). The knowledge that we now have about how our cells adapt help researchers to identify new medicines. For example, they have tried to develop drugs that increase the amount of HIF-1α in cases of anaemia and decrease HIF-1α in cancerous tumours.

Vocabulary list

PROTEINS The building blocks of cells, which can perform many different tasks in the body.

HYPOXIA A medical term that means that a cell is suffering from a shortage of oxygen.

What do you think?

What is the most interesting thing about the Laureates' work?

Alfred Nobel wanted the work of the Nobel Laureates to "have conferred the greatest benefit to humankind". What will be the greatest benefit of the 2019 Laureates' achievements?