

# 'Toxic gases' as targets for new medicines

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Gases once thought of only as environmental pollutants are now known to be produced by the body. They could potentially be used to develop drugs to treat diseases including heart failure and cancer.

Think of [carbon monoxide](#) (CO) and the chances are you will recall tragic stories of poisoning caused by a [gas leak](#). Similarly, [hydrogen sulphide](#) (H<sub>2</sub>S) and nitrogen oxide (NO) were once known only for their negative impacts.

However, decades of research have revealed that while inhaling large volumes of these [gases](#) can be dangerous, they are produced in small quantities throughout the body. Not only are they not harmful in tiny doses, it turns out these gases – known as gasotransmitters – are essential to good health .

"Many diseases are caused by too much or too little of these gases," says Andreas Papapetropoulos, Professor of Pharmacology at the University of Athens. " Understanding their role in the body could have clinical applications ."

Professor Papapetropoulos is chair of COST Action BM1005 which has been working to identify new biological actions of gasotransmitters and translate this knowledge into gasotransmitter-related drugs. This could eventually allow doctors to restore balance where there is too much or too little of these gases.

More than 250 biologists and chemists from 23 countries have been

developing methods to better measure gasotransmitters in cells and have been studying the mechanism of action of NO, CO and H<sub>2</sub>S. They have been developing and evaluating compounds that regulate the amount of gasotransmitters in the body, in collaboration with small and medium enterprises that have experience in this field.

"One area we have identified as having real potential is cardiovascular disease," says Professor Papapetropoulos. "H<sub>2</sub>S protects the heart against ischemia which occurs during a heart attack. NO also lowers blood pressure, which in turn reduces the risk of stroke."

Prompting the body to release more of these protective gases in the heart could save lives. In the digestive system however, too much H<sub>2</sub>S is associated with colon cancer .

"Work done by network members and others has identified H<sub>2</sub>S-producing enzymes that are present in increased numbers in cancer. H<sub>2</sub>S inhibitors could be used to inhibit colon and breast cancer growth and this is a subject for future preclinical and clinical study," Professor Papapetropoulos says.

More than 40 collaborative research papers have been published as a direct result of the gasotransmitters network and a wealth of knowledge, skills, expertise and reagents have been shared among participants.

The next step for this area of study is to explore how these three gasotransmitters interact with one another. With a growing network of young researchers dedicated to this field, Europe is well-placed to capitalise on a fast-growing field.

"We have made good progress in unifying this research area in Europe and we have also contributed on a global scale. This Action has helped to make Europe the primary player in this field," says Professor

Papapetropoulos.

Provided by COST

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