SY1. SYMPOSIUM ON NITRIC OXIDE

Udom Chantraraksri

Department of Pharmacology, Faculty of Science, Mahidol University, Bangkok, Thailand.

ABSTRACT

A component of smog, NITRIC OXIDE is becoming familiar for the role it plays in the human body as a regulator of the flow of blood through veins and arteries. And the molecule is a major factor in an enormous range of physiological functions, including penile erections (by dilating blood vessels; Viagra® works partly by exploiting nitric oxide) and in causing sudden spikes in blood pressure (know as "preeclampsia") in some pregnant women.

White blood cells in the body use nitric oxide to kill infectious agents such as bacteria, fungi and parasites; they even use the molecule to defend against cancerous tumors, in nearly all of these cases, the exact chemical structure of the enzyme making nitric oxide would provide a blueprint for researchers to design drugs or other treatments that will effectively treat these disorders with a minimum of side effects.

Nitric oxide synthase, the enzyme that makes nitric oxide exists in three distinct chemical forms. One form helps the body fight off infections by aiding with an inflammation response; another assists nerve cell transmission within the brain, and the third regulates blood pressure.

Disease or accidents can disrupt the enzyme's "fine tuning," making it produce too much nitric oxide. This disruption can cause high blood pressure (or sometimes dangerously low pressure), shock, or other circulatory problems.

Determining the structure of this enzyme may be an important step in researching how nitric oxide works in the body. From this point, we could find out how to manipulate the enzyme's ability to change blood pressure.

In the future, drugs may be developed that can control blood pressure by controlling the enzyme's ability to make nitric oxide. Similarly, new drugs combating the wide range of diseases in which nitric oxide play a role can be developed once the three enzyme structures are known. Researchers have been frustrated by past drug development efforts because of severe side effects of nitric oxide-inhibiting drugs. Each of the enzyme's three forms have a very specific role. Drugs that control the enzyme hit all three at once, causing severe side effects It is anticipated that by isolating one structure at a time, the researchers can then design drugs that work exclusively on one enzymatic form by exploiting their unique structures.

The researchers are now working on finding the forms of all three enzymes, which has the potential to create new techniques of combating disorders from impotence to shock to bacterial infections. This is a promising new research area in the fight against hypertension and heart disease, and could result in a new group of pharmaceuticals to treat this problem in a more effective way.

Research on nitric oxide is gaining momentum due to the molecules' role in the development of new drugs or therapeutic strategies for the treatment of numerous diseases including: hypertension, stroke, diabetes, dementia, arthritis, traumatic brain injury, adult respiratory distress syndrome, pulmonary hypertension, re-oxygenation re-perfusion injury during surgery, cancer, multiple sclerosis, and other diseases involving impairment of host defense.

The importance of nitric oxide in biomedicine was also emphasized by the recent awarding of the Nobel Prize for Physiology and Medicine (Robert F. Furchgott, Ferid Murad, and Louis J Ignarro) for the discovery of NO as a signal molecule in the cardiovascular system. The "Nitric Oxide Society" was found in 1996, and its official journal 'Nitric Oxide: Biology & Chemistry" was published as Part B of the well known Academic Press Journal Archives of Biochemistry and Biophysics in 1998.

Incidentally, last Thursday (March 18) Ferid Murad, a 1998 Nobel Laureate just gave a state-of-the-art lecture to the 1999 Annual Meeting of ASCPT in San Antonio, USA on " VARIOUS ROLES AND MECHANISMS FOR NITRIC OXIDE PRODUCTION AND POSSIBLE THERAPEUTIC IMPLICATIONS THEREIN"

It's timely, however, that this mini-symposium on NO is organized by the Phartherst". I'm confident that we'll learn a lot today on the 'Pharmacology of Nitric Oxide' from the 2 speakers, a husband-wife team, who have been keeping very closed watch on the literature on NO. This may speak for their very lively appearance!

Ladies and Gentlemen, Drs Surachai & Supeenan Unchern who will entertain us on the Pharmacology of Nitric Oxide in Cardiovascular and Nervous system