



Protein to combat high blood pressure

Wageningen researchers have turned protein from eggs into a product that lowers blood pressure. That is an interesting option for people with health problems who would then not necessarily have to take medication. Researchers in Maastricht are currently looking at whether it is suitable as a nutritional supplement.

TEXT RENÉ RECTOR ILLUSTRATION ANP

Medical biologist Aart van Amerongen has been working for years on a product to reduce high blood pressure, one of the key risk factors in cardiovascular diseases. That would normally be something for university hospitals and pharmaceutical companies, but Van Amerongen, from Wageningen Food & Biobased Research, is focusing not on the development of conventional blood pressure control medication but on products based on the protein in chicken eggs.

Van Amerongen's quest is part of the research by the Bioactive Food & Feed Ingredients group into bioactive substances – natural substances that have an effect on processes in the body and could therefore potentially be used as nutritional supplements.

One such category of natural substances is peptides, the bonding units that form proteins. Peptides play a role in biochemical processes, for example when they block enzymes. The idea is that because of their natural origins, they are likely to be suitable as nutritional supplements to inhibit overactive enzymes and reduce health problems.

BLOOD PRESSURE TOO LOW

One of the key enzymes involved in controlling blood pressure is angiotensin converting enzyme (ACE). 'Some antihypertensive medicines target ACE. Your blood vessels then don't constrict so much and your blood pressure falls,' explains Van Amerongen. But antihypertensives can have side effects: if you take too many, your blood pressure can fall too much, causing dizziness and headaches. 'We knew from the literature that peptides don't have that problem. If you consume more peptides than needed to inhibit ACE, your body breaks them down into amino acids, building blocks for your body.' A mixture of peptides capable of reducing blood pressure could therefore be a good low-risk alternative to conventional high blood pressure medicines.

The researchers chose chicken eggs as the source for the peptides. Van Amerongen: 'You are looking for a basic material that is cheap and plentiful. We chose chicken eggs partly because these eggs contain proteins

that are suitable candidates, partly because chicken-egg proteins are available in pure form and partly because a friendly poultry farmer (who went on to found the biotech company Newtricious) was prepared to start up a joint project.'

EXPERIMENTING

The protein lysozyme, which can be extracted from chicken-egg protein and purified, turned out to be the ideal candidate to experiment with; it can be chopped up into peptides that are known to have an effect on ACE. Van Amerongen and his team experimented with all kinds of enzymes that break lysozyme down into peptides and looked to see whether the peptide mixtures had any effect in an ACE inhibition test. But that did not mean they were finished. Our digestive system is designed to break down peptides. If a pill or nutritional supplement is stuffed full of peptides, there is a big chance that they would be broken down before they could do their good work in the blood or vessel walls containing the enzymes that have to be inhibited. So Van Amerongen and his group exposed the peptide mixtures to models of the oral cavity, stomach and intestines until they found a mixture that was capable of

surviving the journey through the digestive organs.

ON THE MARKET

To demonstrate that NWT-03 (as the peptide mixture is known) works in humans, it is now being tested as a nutritional supplement at the university hospital in Maastricht in accordance with European Food and Safety Authority protocols. 'If that is successful, NWT-03 can probably be put on the market as a preventive product for people with mildly elevated blood pressure, probably mainly to improve the elasticity of the blood vessels,' says Van Amerongen. 'It has a mild effect, but its big advantage compared to conventional blood pressure medicines such as ACE inhibitors is that it has no side effects, according to the literature. That's why I expect NWT-03 to be available over the counter.'

NWT-03 also turns out to have an inhibiting effect on the enzyme DPP-4, which is involved in the delivery of insulin in the blood. That means NWT-03 could well help tackle type 2 diabetes. This is currently being investigated in collaboration with the university hospital in Groningen. ■

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EGGS AND FISH

Eggs are a source of bioactive substances. In addition to the peptide mixture NWT-03, which is being investigated as a possible product for reducing blood pressure, Wageningen is also working on MacuView, a product based on lutein from egg yolks that was developed by Maastricht university hospital to help treat the eye disease macular degeneration. Other egg components are also being studied for their bioactivity. Van Amerongen: 'We also have a project to turn the egg protein ovomucin into a bioactive spray to deal with dry mouth syndrome. It could be used by Sjögren's syndrome patients, people taking multiple medicines or people in intensive care.'

Undersized fish are also being investigated as a possible source of bioactive substances. 'We have studied how we can increase revenues from the mandatory bycatch,' says Jeroen Kals, researcher at Wageningen Marine Research. Useful components can be extracted, explains Kals. 'Mackerel and herring for example are suitable sources of fats and peptides. Fish that live on the seabed such as sole and plaice contain many high-quality proteins that can be used for different purposes than peptides.' But it will take a while before the landing-obligation fish get used for anything other than animal feed. 'It's still a tricky issue politically: if you increase the market value of the bycatch, it will eventually no longer be bycatch – it will become the main catch,' explains Kals.