

The microbial genomics toolbox gives you all kinds of options



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To produce food that is tastier and cheaper yet also safe and keeps well. Is this falling between two stools? No, TNO's generic tool, the microbial genomics toolbox, brings this twin goal closer, and in all kinds of areas.

Food preservation often comes about through trial and error: a good dose of heat and hope that the microbes die. In 2001, following two years of research, TNO brought a new technology that enables better food preservation to maturity. This technology, whereby microbes and their well-being can be measured rapidly and relatively cheaply, also lies at the basis of the microbial genomics toolbox.

Since this toolbox allows you to determine exactly when a microbe dies, you can design new food preservation strategies, according to Dr Roy Montijn. 'A touch more heat, an additional drop of antimicrobial matter, more pressure or less salt – you can design the best food product preservation. Nobody likes those limp, boiled and canned green beans. Rather crunchy greens that taste fresh and are safe to eat – that's what tasty preservation makes you think of.'

Montijn: 'What I constantly try to do is translate top technology and top science into practicable solutions for customers. We do a lot in the area of food safety for the food industry. Companies like FrieslandCampina, Unilever, Nestlé, Hormell and JohnsonDiversey. We are also developing a *tool* to identify toxic substances. Say you have a toxic substance, like a dioxin, in your food, then an alarm will automatically ring and you can take appropriate measures.'

MRSA

The Legionella chip has already been well covered in the media. A study by the Kennemerland Regional Laboratory, TNO and the Vitens waterworks has revealed that there are harmful and harmless *Legionella* bacteria. Montijn: 'You need not intervene so quickly for the harmless strain. We are currently working with Professor Jan Verhoef, medical microbiologist at the UMC Utrecht, to describe the properties of other pathogenic micro-organisms. For instance, we can accurately type the dangerous MRSA strains and this allows you to determine whether certain strains are epidemic or not. We would like to develop a chip for good hospital or nursing home hygiene.'

A really troublesome problem is the biofilm that can occur at the interface of a solid and a liquid. Montijn: 'Microbes like to attach themselves to a solid and are therefore much

more resistant in a biofilm than *loose* cells are in a liquid. They are more difficult to combat. In general, micro-organisms are becoming increasingly less susceptible to antibiotics both in and outside hospitals. Our toolbox could help in developing a new generation of antibiotics.'

TNO has also developed DNA chips that are able to make a kind of photo of complex microbiotic flora on the skin, in the intestine, mouth or vagina. Montijn: 'We can observe a couple of hundred types at the same time. What we mainly want to know is the composition of the flora. Do they contain too many pathogens? Can you influence the composition to such an extent through food or medicines that they create a healthier situation? Green tea appears, by coincidence, to be such a health-promoting food.'

ALLERGY

Montijn: 'We have also found that the intestinal flora of people that are affected by certain types of allergy are completely different from those in *healthy* people. And very specifically different, too. We don't know whether that difference is the cause of effect of the allergy. We found out that the intestinal flora of babies that are allergic to cow's milk contain specific allergens that are not present in babies that do not suffer from this allergy. So far it has proved difficult to establish cow's milk allergy among babies – but all we need is a dirty diaper.'

Info: roy.montijn@tno.nl



Photo: Wilho Worms