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## »Lean Production« in the world of bacteria

**(Stuttgart) – Insilico Biotechnology will use its models and simulations to improve bioproduction via bacteria by throwing unnecessary ballast overboard. Bacteria for industrial purposes can do without the survival and adaptation strategies needed in natural environments so these metabolic pathways and products are to be eliminated for production processes. The pioneer research project is supported by the Federal Ministry of Education and Research (BMBF) and Insilico Biotechnology is one of the partners.**

Minimalism is becoming fashionable for the production of microbial ground substances. Now that system-wide methods have been found to optimize the metabolism of production strains, researchers are looking for ways to free the bacterial genome from all the genes and corresponding metabolic processes it will not need in the fermenter. »Genome reduction can occur now and again in nature e.g. when a bacterial species permanently colonizes a niche with stable environmental conditions so that the organisms no longer need to adapt to changes. We plan to use this reduction potential to make bioproduction in the fermenter much more efficient, « explains Klaus Mauch, CEO of Insilico.

Insilico will pool its expertise with that of the other project partners from research and industry to identify genes, which can be classified as non-essential for life in the fermenter. In this first stage, Insilico Biotechnology's models and simulations will be more than helpful. Another major advantage is that gene reduction will be carried out initially on *Corynebacterium glutamicum*, a strain used widely for production on which Insilico has been working for some time now. The project will therefore profit from know-how and data gained in other recent projects on this bacterial strain, a major synergetic advantage for all involved.

In a second step, genetic engineering will be used to reduce the genome in the laboratory according to *in silico* predictions by bundling essential and removing non-essential genes. The resulting strains will then be tested for performance under laboratory and production conditions. Insilico will also run model-based analyses on all metabolic rates to identify further potential for optimization.

A special subproject will test whether gene-reduced bacteria can be used to fixate carbon dioxide which affects our climate and if so, to what extent. Carbon dioxide usually plays a very minor role in the metabolic repertoire of *Corynebacterium*. The research group will attempt to give this role precedence by modifying the genome through targeted intervention.

The ambitious project will run for an initial period of three years supported by BMBF with approx. 2.5 million EUR and with an option for a further three years if work goes according to plan. Insilico's partners in this innovative research are Evonik Industries AG and research groups from Forschungszentrum Jülich as well as the Universities of Cologne and Bielefeld.

# Press release



**Insilico Biotechnology** reconstructs, simulates and predicts the performance of complex cellular systems for the chemical and pharmaceutical industries. Successful in business since 2001, Insilico has internationally renowned expertise and a unique technology platform for connecting cell model libraries with simulation processes. Insilico analyses the latest biotech data and integrates it in mechanistic whole-cell network models. With its high-performance computing techniques, Insilico develops superior solutions for manufacturing biochemicals and biopharmaceuticals and achieves considerable cuts in the time needed for drug toxicity tests. Insilico is a privately-owned company, located in Stuttgart, Germany.

**Contact:**

Insilico Biotechnology AG  
Dr. Heike Lehmann | Public Relations  
T +49 711 460 594-18  
F +49 711 460 594-10  
heike.lehmann@insilico-biotechnology.com  
[www.insilico-biotechnology.com](http://www.insilico-biotechnology.com)