

# Popular scientific result summary for project funded by Ekhagastiftelsen

Popular scientific result summary is to be submitted by e-mail within 3 months of project end.

Application number:	2013-127
Project title:	Stepwise improvement of a Biocrystallisation Assay for examining effects of homeopathic preparations using cress seedlings
Receiver of grant (name, address):	University of Bern Institute of Complementary Medicine KIKOM CH-3010 Bern Switzerland
Contact / project manager:	Dr. Stephan Baumgartner
Project start (yyyy-mm-dd):	2014
Project end (yyyy-mm-dd):	2016-12-31
By Ekhagastiftelsen granted sum:	SEK 270 000

Result summary: (max 900 words)

## Introduction

A major challenge in basic homeopathic potentisation research is the development of a well-defined bioassay that generates evidence for specific effects of homeopathic preparations. Within a precursor project, we developed a bioassay, which yielded highly significant evidence for specific effects of an ultra-molecular *Stannum met.* D30 preparation, based on 15 independent randomized and blinded experiments performed at 2 independent laboratories. The bioassay is based on cress seed germination, biocrystallisation and subsequent computerised image analysis of the crystallisation patterns. Although the overall statistical significance over the 15 experimental days was high, only a limited number of individual experimental days showed a statistical significance. This raised the question whether the non-significant days were a consequence of the followed laboratory procedures and/or due to an inadequacy of the applied image analysis algorithm.

## Problem Definition

Biocrystallisation patterns exhibit a radial ramified structure. The currently applied image analysis algorithm follows however a rectangular evaluation path. In this project we aimed at improving the image analysis, and thereby the applicability of the bioassay, by 1) making a shift to a more 'picture-mimicking' approach by means of a radial and angular evaluation path, in combination with 2) adjusting the type of the evaluated area (Region Of Interest ROI) from a geometric-centre based ROI to a crystallisation-start based ROI. The crystallisation-start is the nucleating site from which the crystal growth spreads outward from. Using the crystallisation-start as centre of the ROI is of particular interest as it encompasses the crystallisation process from centre to periphery of the dish. The original data-evaluation of the precursor project was based on a rectangular evaluation path in combination with a geometric-centre based ROI.

## Results

The essential result of the project is that we could verify our hypothesis that the new radial evaluation path performed on a crystallisation-start based ROI gives a better separation of the signals from the homeopathic treatment, which were earlier mixed up in two groups of texture analysis variables. We now have three groups of texture analysis variables, which show independent signals for *Stannum met.* 30x. These three signals originate from either the centre or the periphery of the crystallisation patterns, and in the periphery we have a constant and a time-varying signal. This advance in the data evaluation will help in communicating the results of former, current and future studies with the biocrystallisation method, not only in pharmaceutical research, but also in biological, agricultural and medical use of the method.