

## Boswellia smartCrystals for Dermal Application: Production and Stability

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### **Purpose**

Dermal application of Boswellia extract is of interest in treatment/skin care of atopic dermatitis and psoriasis. To have a well penetrating dermal formulation, the feasibility of producing small and physically stable nanocrystals (> 100 nm, smartCrystals) was investigated.

### **Methods**

Boswellia extract was provided by KOKO, and used to produce smartCrystal nanosuspensions by high pressure homogenization (HPH) and by bead milling (BM). Composition: Boswellia 10%, stabilizer 1% and water up to 100%. Stabilizers used: Plantacare 810, 818, 1200, 2000 and TPGS. A coarse pre-suspension was produced by high speed stirring and passed through a homogenizer Micron LAB 40 (APV Deutschland, Germany), conditions: pre-milling at lower pressures, then 1-20 cycles at 1,500 bar. Alternatively bead milling up to 30 min was performed (Bühler PML2 small chamber, Switzerland). Characterization was performed regarding size (photon correlation spectroscopy (PCS), laser diffraction (LD), light microscopy) and zeta potential (in dist. water, conductivity 50 µS/cm). Storage stability was performed at room temperature for 2 months by now.

### **Results**

The Boswellia extract could be diminished to nanocrystals by HPH pre-milling only, yielding about 400-480 nm, depending on the stabilizer. After subsequent 5 homogenization cycles at 1,500 bar, about 320 nm were obtained with Plantacare 810 and 1200, the other stabilizers were around 350 nm. In contrast, BM yielded a similar size of about 500 nm to HPH pre-milling after just 5 min milling, but was not able to reduce the size further. On the contrary crystal aggregation occurred with increasing milling time up to 30 min (Plantacare 810). The zeta potential measured in distilled water (= Stern potential) was for all stabilizers – independent on the production method – between -35 mV and -60 mV, i.e. in the range of long-term stable suspensions.

### **Conclusion**

Boswellia smartCrystal could be produced most efficiently by HPH (= method of choice), with Plantacare 810 and 1200 yielding smallest size. Boswellia extract as soft material tended to aggregate in the low energy bead milling. From data by now and the zeta potentials measured sufficient long-term stability for a dermal product is given.