

## BIOACTIVITY MATRICES FOR PARTIALLY ACETYLATED CHITOSAN OLIGOMERS

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Partially acetylated chitosan polymers exhibit a number of biological activities, including anti-microbial activities, elicitor activities inducing disease resistance in plants, and diverse stimulating or inhibiting activities towards a number of human cell types. Using series of highly purified and well characterised chitosans, we have previously shown that these biological activities are determined by the physico-chemical properties of the polymers used, most notably their degree of acetylation (DA). In contrast, the degree of polymerisation (DP) of the polymers used had less influence on the biological activities. We have visualised the relationship between DA and DP of chitosan polymers on the one hand, and the antimicrobial or elicitor activities on the other hand, in the form of bio-activity matrices [1, 2].

In order to establish more detailed structure/function relationships, we have now started to work with series of partially acetylated chitosan oligomers. We have partially hydrolysed a chitosan polymer (av. DP<sub>n</sub> 962) with a DA of 42 %, and we have purified a series of oligomers ranging in DP from 1 to >19, all of them having DAs between 34 and 53 % [3]. These oligomers were previously analysed for their elicitor activities towards suspension-cultured wheat cells, and oligomers with a DP above 4 were shown to elicit a rapid oxidative burst [4]. We are currently testing these oligomers for their anti-microbial activities. We have also prepared a mixture of fully de-acetylated chitosan oligomers with DP ranging from 3 to 9, and this mixture was then partially re-acetylated to yield a series of oligomer mixtures ranging in DA from 0 to 90 %. These mixtures are now being tested for their elicitor activities in suspension cultured plant cells, and for their anti-microbial activities.

[1] El Gueddari N.E., B.M. Moerschbacher (2004) A bioactivity matrix for chitosans as elicitors of disease resistance reactions in wheat. *Adv. Chitin Sci.* **7**: 56-59

[2] Moerschbacher, B.M. (2005) Bio-activity matrices of chitosans in plant protection. In: S.S. Gnanamanickam, R. Balasubramanian, N. Anand, eds., *Emerging Trends in Plant-Microbe Interactions*. University of Madras, Chennai, pp. 186-190

[3] Bauknecht H., B.M. Moerschbacher, N.E. El Gueddari; K.M. Vårum (in preparation) Separation and characterization of a series of partially de-N-acetylated chitosan oligomers.

[4] Bauknecht H., K.M. Vårum, B.M. Moerschbacher (in preparation) Partially de-N-acetylated chitosan oligomers elicit a rapid and transient oxidative burst in suspension cultured wheat cells.