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The effect of nitration on the potential allergenicity of wheat derived alpha amylase trypsin inhibitors (ATIs)

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Over the past decades, environmental pollution and allergy incidence have been increasing on a global scale, implicating that they are interconnected. Air pollutants e.g. nitrogen dioxide and ozone are capable of chemically modifying airborne allergens, particularly under humid summer smog conditions. As demonstrated for birch pollen Betv1, these nitrated allergens are known to have enhanced allergic potential. We demonstrated that wheat derived alpha-amylase-trypsin inhibitors (ATIs), which previously were identified as major allergens of baker's asthma, are also strong activators of the intestinal innate immune system when ingested with wheat products. Moreover, via their innate immune stimulatory activity, these ATIs also promote experimental allergies. As air pollution and fertilizers can lead to nitration of these ATIs in the living grains, the aim of this project was to elucidate the effect of nitrated ATIs on innate and adaptive immunity. Therefore, a HeLa TLR4 dual reporter cell line was stimulated with untreated ATIs vs. nitrated ATIs. Furthermore, human monocyte-derived dendritic cells (DC) were exposed to ATIs or nitrated ATIs and changes in specific DC maturation markers and cytokine patterns were analyzed by flow cytometry or multiplex ELISA. Additionally, T cell proliferation after co-cultivation with different ATI-treated autologous DC was determined. In all these different *in vitro* systems we could demonstrate a stronger stimulatory capacity of nitrated ATIs in comparison to native ATIs, indicating that nitration of an antigen/allergen not only affects its allergenicity but also its immunogenicity.

Biography

Kira Ziegler has obtained her Diploma in Biology from the Johannes Gutenberg-University, Mainz, Germany. The topic of her thesis was "Expression and recovery of two recombinant proteins in *Escherichia coli* for cancer vaccination". Following this, she started her PhD at the Max Planck Institute for Chemistry, Mainz, Germany. Her research focusses on the allergenic effect of nitration on wheat derived alpha amylase trypsin inhibitors, bridging with this topic atmospheric science and fundamental medical research.

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