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L4 Thunderstorm Asthma: In Search For Relationships With Airborne Pollen And Fungal Spores From 23 Sites In Bavaria, Germany. A Rare Incident Or A Common Threat?

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RATIONALE: Thunderstorms have been associated with increased occurrence of asthma incidents, some of them even causing fatalities. To date, no determinative relationship among responsible co-factors has been revealed (the full diversity spectrum of pollen *and* fungal spores *and* relevant meteorological factors). The aim of this study was to assess the risk of asthma attacks during thunderstorm events.

METHODS: In the project Climate Change and Health (Bavarian State Ministries of the Environment and Consumer Protection and of Health and Care), a dataset from 23 monitoring stations across Bavaria, Germany, during 2015 on a daily scale was analyzed for: A) lightning occurrence, B) pollen and fungal spore abudances, C) asthma emergency cases. Multivariate, full-factorial GLM models were applied, along with time-series analysis and exploratory techniques to identify a potential co-occurrence.

RESULTS: A synchronisation of pollen and fungal spore incidence with lightnings was found, as well as lightnings with asthma cases. Clusters of high pollen and spore abundances across Bavaria coincided with similar clusters of high thunderstorm frequency. Asthma cases were correlated positively during thunderstorm events and, particularly, only with the interaction of lightnings and grass pollen (p=0.011, R^2=0.64). It was striking that additional pollen types, apart from the usual suspect, Poaceae pollen, were implicated in asthma cases, like the also highly allergenic *Artemisia*, *Plantago* and Urticaceae.

CONCLUSIONS: As thunderstorm asthma may be life-threatening, prospective investigations of the interaction effect of thunderstorms, aeroallergens and severity of allergic symptoms have to be integrated in the regular environmental urban monitoring and planning of policy makers.