European Respiratory Society
Annual Congress 2013

Abstract Number: 1772

Publication Number: P1275

Abstract Group: 9.1. Respiratory Function Technologists/Scientists

Keyword 1: Breath test **Keyword 2:** Extrapulmonary impact **Keyword 3:** Physiological diagnostic services

Title: An application of electronic nose technology for diagnosis of Alzheimer's disease

Dr. Andreas Rembert 13238 Koczulla koczulla@med.uni-marburg.de MD [1], Dr. Maike 13254 Gold gold@staff.uni-marburg.de [2], Mr. Akira 13255 Hattesohl hattesohl@staff.uni-marburg.de [1], Dr. Dirk 13256 Lubbe Dirk.Lubbe@psychol.uni-giessen.de [3], Dr. David 13257 Mengel david.mengel@med.uni-marburg.de [2], Dr. Severin 13258 Schmid SeverinSchmid@gmx.net [1], Dr. Björn 13259 Tackenberg bjoern.tackenberg@med.uni-marburg.de [2], Prof. Jürgen 13263 Rieke rieke@med.uni-marburg.de [2], Dr. Sasidhar 13264 Maddula maddula@bs-analytik.de [4], Dr. Jörg Ingo 13266 Baumbach Baumbach@bs-analytik.de [4], Dr. Joan 13267 Michelis michelis@neurologie.uni-bonn.de [5], Dr. Judith 13273 Alferink alferink@psychiatrie.uni-muenster.de [7], Dr. Michael 13275 Heneka heneka@dzne.de [8], Prof. Dr Wolfgang 13279 Oertel wolfgang.oertel@med.uni-marburg.de [2], Prof. Frank 13280 Jessen jessen@psychiatrie.uni-bonn.de [7], Prof. Dr Sabina 13281 Janciauskiene sabinajanciauskiene@gmail.com [9], Prof. Dr Claus 13282 Vogelmeier vogelmeier@med.uni-marburg.de [1], Prof. Dr Richard 13284 Dodel richard.dodel@med.uni-marburg.de [2] and Dr. Jan-Philipp 13285 Bach jan-philipp.bach@med.uni-marburg.de [2]. [1] Department of Internal Medicine, Division of Pulmonary Diseases University of Marburg, Marburg, Hessen, Germany, 35043 ; [2] Department of Neurology, University of Marburg, Marburg, Hessen, Germany, 35043 ; [3] Department of Psychology, Division of Methodology and Statistics, University of Giessen, Giessen, Hessen, Germany, 35394 ; [4] B&S Analytik, BioMedicalCentre Dortmund, Dortmund, Germany ; [5] Department of Neurology, University of Bonn, Bonn, Germany ; [6] Department of Psychiatry, University of Bonn, Bonn, Germany ; [7] Department of Psychiatry, University of Muenster, Münster, Germany ; [8] German Centre for Neurodegenerative Disease (DZNE), DZNE, Bonn, Germany and [9] Department of Internal Medicine, Division of Pulmonology, Hannover, Germany .

Body: Background: Alzheimer’s disease (AD) is a chronic neurodegenerative disorder that mainly affects elderly people. Diagnosing AD on clinical grounds is difficult and based on the measurement of amyloid-beta (Aβ), (phosphorylated)tau-protein in cerebrospinal fluid. The specificity is rather low. Novel diagnostic tools via exhaled breath (EB) have been applied to identify patients with respiratory diseases like electronic nose devices (eNose and ion-mobility spectrometry, (IMS)). In this study, we introduce these techniques to the field of Alzheimer’s disease. Methods: AD patients and healthy controls were sampled for EB and EB condensate analysis in two study centers (AD n= 18, 21), (HC n= 19, 16). EB condensate and human lung tissue were analyzed for different Aβ species, tau-protein using ELISA. EB was analyzed for volatile organic compounds (VOC)s by patterns (Cyranose 320, IMS) and by single VOCs (IMS). Results: By Cyranose 320R we could differentiate with the leave-one-out cross-validation between healthy control and AD patients with a sensitivity of 69.8 % and a specificity of 68.7 %. Based on single identified

substances with IMS a decision tree was calculated to differentiate between AD and HC (sensitivity 81 %, specificity of 95 %). We identified Aβ species in the lung tissue of healthy controls and within the EB condensate in both groups; however, no significant differences within the groups were detected. Conclusions: These data opens new possibilities in the diagnosis of AD. Interestingly the difference in both groups seems not related to Aβ species and tau-protein. Further research is required to evaluate the significance of these findings in relation to the pathophysiology of AD.