association between baseline BMI and mortality, but longitudinal decline in BMI did confer an increasing mortality risk (RR 1.40 for each 1% change in BMI; 95% CI 1.06–1.98, p<0.019). Those with ≥5% annual decline in BMI were at significant risk of mortality compared to patients not experiencing a decline (RR 2.13, 95% CI 1.46–3.13; $p<0.001$) (figure 1).

Conclusions Patients with more severe disease at baseline have a lower BMI at the time of diagnosis. While baseline BMI does not predict mortality, progressive decline in BMI does.

Asthma: endotypes/biomarkers

P11 SPUTUM NEUTROPHIL ACTIVITY IN ASTHMA

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Background An abundance of neutrophils in sputum is associated with poor disease control[1]. In contrast to eosinophils, the role of neutrophils in asthma is poorly understood. Sputum neutrophil activity rather than proportions may provide a better insight into disease activity.

Objective The purpose of this analysis was to explore the relationship between sputum markers of neutrophil activity, symptoms and lung function in asthma.

Methods 23 mild asthma and 159 severe asthma patients recruited to the Wessex severe asthma cohort study underwent complex characterisation including spirometry, questionnaires and sputum induction. Sputum analysis included protein assays and differential cell counts. Myeloperoxidase (MPO) and Neutrophil Elastase (NE) were measured as markers of neutrophil activity using singleplex ELISA. Correlation analysis of lung function and asthma control with sputum measures were completed using Spearmans rho.

Results Weak correlations were found between lung function and sputum measures. However, neutrophil activity had a stronger relationship with lung function than neutrophil proportion. Asthma control (ACQ6) had a very weak correlation with sputum neutrophil proportion but a weak significant relationship with markers of neutrophil activity.

Conclusion Neutrophil activity in sputum is more reflective of lung function and asthma control than sputum neutrophil proportion in asthma. Markers of neutrophil activity, rather than neutrophils per se, may more accurately reflect the inflammatory processes in poorly controlled asthma.

Abstract P11 Table 1

	Neutrophil%		Sputum MPO ng/ml		Sputum NE ng/ml	
	r	p	r	p	r	p
Pre FEV_1%predicted	**-0.248**	*	**-0.364**	**	**-0.351**	**
Post FEV_1%predicted	**-0.237**	*	**-0.346**	**	**-0.316**	**
Pre PEF%predicted	**-0.273**	**	**-0.311**	**	**-0.318**	**
Post PEF%predicted	**-0.270**	**	**-0.307**	**	**-0.286**	**
ACQ6	**0.134**	**0.043**	**-0.227**	**0.001**	**-0.327**	**

Correlations of sputum biological markers and lung function and disease control in asthma n=182. Analysis using spearman rho, **p≤0.0001, * p≤0.0005

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P12 ASTHMA BREATHOMICS – A SYSTEMATIC REVIEW OF EXHALED VOLATILE ORGANIC COMPOUNDS ASSOCIATED WITH DIAGNOSIS AND DISEASE CHARACTERISTICS

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Introduction Breathomics is the study of the metabolome – those metabolites associated with a biological system – via the sampling of exhaled breath. As a potential non-invasive indicator of disease processes, breathomics has been applied to a wide range of diseases including asthma. We aimed to assess the evidence for the use of breathomics in the identification of disease and disease characteristics in adults with asthma.

Design A systematic review and qualitative analysis of the published literature on exhaled volatile organic compounds in adult asthma.

Methods We conducted online databases searches - including PubMed, Embase and OVID medline - in November 2018. We included studies of adult asthma (physician diagnosed or diagnosed according to recognised guidelines), collecting exhaled breath volatiles by any method and presenting primary data.

Results Twenty studies were identified; methodologically heterogenous they exhibited a variable risk of bias. Meta-analysis was deemed inappropriate and a qualitative, narrative analysis presented. Assessment using the CASP diagnostic checklist (Critical Appraisal Skills Programme, 2017) revealed studies to be of largely good quality, however, scores were reduced due to the hypothesis-generating stage of the research; none were studies of diagnostic test accuracy. Those studies comparing healthy controls and participants with asthma reported moderate or greater accuracy in the discrimination of samples, or significant differences in compound levels. Asthma phenotypes were differentiated with similarly high levels of accuracy in all but one study. Nine studies named those compounds which they had identified as significant; seventy six compounds were reported in total, of which nine were reported in two papers, and two (acetone and isoprene) featured in three.

Conclusion Results are encouraging but there was little concordance between studies in respect of the compounds upon which discriminatory models were based, and models based on such large data-sets are at risk of over-fitting. Validation using independent prospective cohorts and larger participant numbers is required; success would constitute an important step towards non-invasive disease monitoring and the development of personalised medicine in asthma.