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Title: A low total sputum cell count is a marker for asthma remission during adolescence

Dr. Khalid 25728 Bawakid bawakidk@yahoo.com MD [1], Dr. Zamil 25729 Al-Shammari zam-immuno@hotmail.com MD [1], Dr. Laurie 25730 Lau l.c.lau@soton.ac.uk MD [2], Prof. Wilfried 25731 Karmaus karmaus@sc.edu MD [3], Prof. Susan 25732 Ewart ewart@cvm.msu.edu MD [4], Dr. Ramesh 25764 Kurukulaaratchy Ramesh.Kurukulaaratchy@uhs.nhs.uk MD [1], Prof. Graham 25780 Roberts g.c.roberts@soton.ac.uk MD [1], Dr. Abid 25832 Raza abid.raza@soton.ac.uk MD [2] and Prof. Hasan 25846 Arshad S.H.Arshad@soton.ac.uk MD [1]. [1] Clinical and Experimental Academic Unit, Respiratory Biomedical Research Unit, and David Hide Asthma and Allergy Research Unit, Isle of Wight, University of Southampton, United Kingdom ; [2] Clinical and Experimental Academic Unit, Respiratory Biomedical Research Unit, University of Southampton, United Kingdom ; [3] Department of Epidemiology and Biostatistics, University of South Carolina, SC, United States and [4] Veterinary Medicine,, Michigan State University, East Lansing, MI, United States .

Body: An improved understanding of the physiological and pathological characteristics underlying adolescent asthma phenotypes, especially those who grow out, is essential. Methods: A Birth Cohort (n=1456) was established on the Isle of Wight, UK and seen until 18-years. Relevant tests at 18-yrs included ISAAC questions, spirometry, exhaled nitric oxide (FeNO), skin test, bronchial responsiveness (BHR) and (in a subset) sputum induction and processing. Asthma groups were “never asthma” (no asthma since birth), “persistent asthma” (asthma at age 10 and 18), “remission asthma” (asthma at age 10 but not at 18) and “new-onset asthma” (asthma at age 18 but not at age 10). This analysis is confined to subjects who underwent sputum induction. Results: Asthma (new-onset or persistent) group (n=40) had a higher eosinophil count (1.73% (interquartile range [IQR] (25-75): 0.25-5.88) vs.0.25 % (IQR: 0 – 1.25); p=0.01) and ECP (median 115.00 (62.08-374.95) vs. 62.34 (25.44 -229.30); p=0.04) compared to never asthma (n=46) at age 18. Importantly, those with asthma remission (n=18) had a lower total cell count compared to never asthma (31.50 (12.88-40.38) vs. 47.00 (19.50-181.25); p=0.03), even though both groups were asymptomatic at age 18 and their lung function, BHR and FeNO were not significantly different. Remission group also had a significantly reduced eosinophil 0.25 % (IQR: 0 – 1.44) vs. 3.00% (0.66-6.56); p=0.05) compared to those with new-onset asthma (n=20) and a lower ECP when compared to those with asthma at age 18 (median 35.48 (18.74-229.63) vs. 115.00 (62.08-374.95); p=0.05. Conclusion: A low sputum total cell count is indicative of asthma remission during adolescence.