

**Background** There are major concerns and uncertainty regarding a possible reduction in growth velocity and final height of children with asthma who are long-term users of inhaled corticosteroids (ICS). We aimed to evaluate the association between ICS use of >12 months and growth.

**Methods** We initially searched MEDLINE and EMBASE in July 2013, followed by a PubMed search updated to June 2014. We used a combination of search terms involving drug names and adverse effects of interest (such as growth or height), and we also hand-searched reference lists of existing systematic reviews and trial reports. We selected RCTs and controlled observational studies of any ICS vs non-ICS control treatment in patients with asthma (treatment duration of at least 52 weeks). Meta-analysis of continuous outcomes (growth velocity in cm/year or final height in cm) was conducted using RevMan 5.3. We analysed mean differences using inverse variance method, random effects model. Heterogeneity was assessed using the I<sup>2</sup> statistic.

**Results** We found 21 relevant studies (seventeen RCTs and four observational studies) after screening 1876 hits from the search. Meta-analysis of 16 RCTs showed a significant association between ICS use and reduction in growth velocity compared to controls (pooled Mean Difference -0.35cm/year, 95% CI -0.54 to -0.18). No significant reduction in growth velocity with ICS was reported in two observational studies of lower quality (pooled Mean Difference 0.03cm/year, 95% CI -0.61 to 0.67). Analysis of final adult height showed a mean reduction of -1.20 cm (95% CI -1.90 cm to -0.50 cm) with budesonide versus placebo in a high quality RCT. Meta-analysis of two lower quality observational studies found a non-statistically significant pooled mean reduction in final adult height of -0.85 cm (95% CI -3.35 to 1.65).

**Conclusion** Use of ICS for 12 months or more in children with asthma has a limited impact on annual growth velocity, with a slight reduction in final adult height. When interpreted in the context of the typical final adult height in the UK, ICS users may experience less than 0.7% reduction in height compared to non-ICS users.

#### P235 PREDNISOLONE/CORTISOL SPOT TEST OF NON-ADHERENCE IN CORTICOSTEROID-DEPENDENT ASTHMA

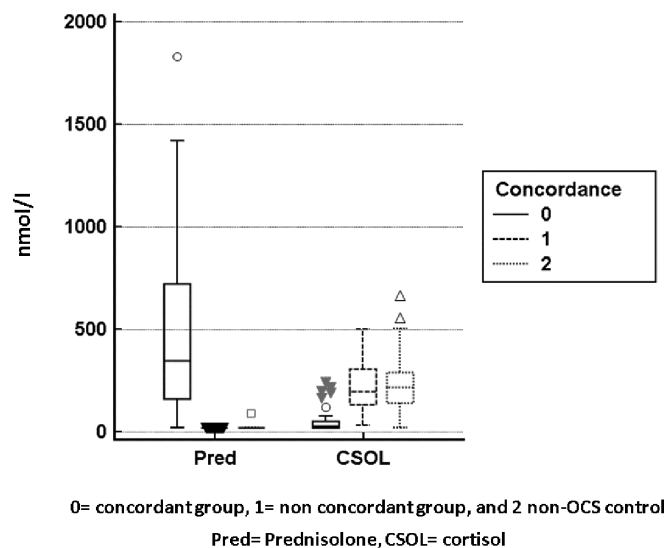
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**Background** About 40% of severe asthmatics require maintenance oral corticosteroids (OCS) for disease control. However, significant proportion of these patients continues to have poor disease control due to OCS unresponsiveness or non-adherence (Gamble 2009).

**Methods** Using a validated in-house developed liquid chromatography/mass tandem spectrometry (LQ/MSMS), we conducted spot measurement of serum prednisolone, prednisone and cortisol in 111 patients attending our severe asthma clinic over a 12 months period. Patients not on maintenance OCS comprised the control group. Suppressed cortisol (20nmol/l, were considered as compatible with adherence to OCS, whilst unsuppressed cortisol and undetectable prednisolone were considered as non-adherent. For validation purposes the test was repeated multiple times in few cases.

**Results** The prednisolone/cortisol spot test was conducted on 111 patients (79% females) with 44 (40%) were not on regular OCS (control group) and 67 (60%) on maintenance OCS. The



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spot test revealed non-adherence in 27/67 (40%) of patients and adherence in 40/67 (60%) of patients. The prednisolone/prednisone/cortisol assays were similar in non-adherent group and non-OCS group (figure). The mean daily prednisolone dose was 16.3, 20.1, and 0.0 mgs in the adherent, non-adherent and non-OCS groups respectively. Non-adherent patients had lower BMI, and higher exacerbations frequency, blood eosinophil count, and fraction exhaled nitric oxide than OCS adherent group. The non-adherent group resembled more the non-OCS group with regard to aforementioned parameters.

We conclude that this prednisolone/cortisol spot test is reproducible and diagnostic of non-adherence to OCS in 40% of patients on maintenance OCS, and should be routinely measured in severe asthma clinics to improve patients management.

#### P236 RELATIONSHIP BETWEEN BONE MINERAL DENSITY AND BONE TURNOVER MARKERS IN SEVERE ASTHMA PATIENTS ON SYSTEMIC CORTICOSTEROIDS

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**Objectives** Measure bone turnover markers (BTM) CTx, P1NP and bone-specific alkaline phosphatase (BsALP) in a severe asthma population using systemic corticosteroids (SCS). Assess bone mineral density (BMD) change in regional severe asthma clinics.

**Background** Severe asthma often requires regular SCS use. SCS cause several adverse effects including reduced bone metabolism; resorption is increased and formation is decreased resulting in osteoporosis. DXA scans monitor BMD in the hip and spine every 3–5 years. BMD decrease is treated with bone sparing medication (BSM), but treatment is retrospective and response takes years to assess. BTM represent markers of systemic bone metabolism and may offer a more efficient alternative. CTx is a resorption marker, P1NP and BsALP are formation markers.

**Method** Patients attending Manchester or Belfast severe asthma clinic with two or more DXA scans were identified from case files. We measured BTM in Manchester severe asthma patients