

### 193 Development of a Standardized Clinician-Graded Scale for Assessment of Nasal Turbinate Inflammation Induced by Exposure to the Allergen BioCube

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**RATIONALE:** There are few reliable, objective measurements of allergic rhinitis severity. A standardized scale of nasal turbinate inflammation has been developed to complement subjective assessments of rhinitis severity for use in clinical trials.

**METHODS:** A single-center, IRB approved, Allergen BioCube study was conducted. Subjects with history of allergic rhinitis and positive skin test reaction to ragweed entered the BioCube 3 consecutive days. Twenty-four subjects were enrolled. Nasal allergic symptoms (pruritus, rhinorrhea, sneezing, and congestion) were subjectively assessed every 15 minutes, using standardized 0-3 unit scales and were combined for the total nasal signs and symptoms (TNSS) score. Intranasal videography was performed prior to each visit and following BioCube exposure using Karl-Storz rhinoscope Xenon 300. Images captures before and after allergen exposure were used to generate the standardized inferior turbinate inflammation scale. Post-hoc assessments of inflammation severity and TNSS scores were performed to correlate rhinitis signs and symptoms using the new scale.

**RESULTS:** Subjects evaluated as having more severe inferior nasal turbinate inflammation tended to report higher TNSS scores, particularly for nasal congestion. The Allergen BioCube successfully induced increased signs and symptoms of nasal inflammation.

**CONCLUSIONS:** For the first time, a clinician graded scale of inferior nasal turbinate inflammation has been successfully used to provide an objective measure of allergic rhinitis severity.

### 194 Reference Values And Determinants Of Nasal Nitric Oxide In Healthy Adults

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**RATIONALE:** The measurement of nasal nitric oxide (nNO) can be used for the diagnosis and the management of upper airway diseases. Lack of reference value limits the clinical application of nNO measurement. This aim of this study is to assess the reference values and affecting factors of nNO in healthy adults.

**METHODS:** We recruited 87 healthy adults, aged 18-56, in Korea after exclusion of subjects with symptoms or previous diagnosis of rhinitis, sinusitis or asthma. Measurement of nNO was performed at the transnasal flow of 700 ml/min. Atopy was defined as the presence of positive skin prick test response to common aeroallergens. We measured the fractional exhaled nitric oxide (FeNO) to evaluate the relationship with nNO.

**RESULTS:** The geographic mean of nNO levels was 227.3 ppb (95% reference interval, 116.5 to 443.6). The nNO concentrations were not related with by age, gender, atopy, smoking status, height, weight, BMI or atopy. The ambient NO levels affected significantly nNO levels (coefficient 0.004,  $P = 0.004$ ). FeNO was positively correlated with nNO ( $r = 0.308$ ,  $P = 0.004$ ).

**CONCLUSIONS:** This study presented the reference values of nNO and the effect of ambient NO on nNO concentrations. The proposed nNO values could be used for research and clinical practice of upper airway diseases.

### 195 Nasal and Exhaled Nitric Oxide Monitoring During Specific Inhalation Challenge using a Portable Analyser

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**RATIONALE:** Nasal nitric oxide (nNO) and exhaled nitric oxide (eNO) are regarded as non-invasive markers of upper and lower airways inflammation, respectively. A portable NO analyzer has been developed and validated for measuring nNO and eNO. We used this device to monitor the kinetics of nNO and eNO during specific inhalation challenge (SIC).

**METHODS:** Eight bakers with confirmed occupational rhinitis and asthma underwent control SIC and flour SIC on consecutive days. Nasal and bronchial responses were monitored by acoustic rhinometry, nasal lavage, symptoms grading, spirometry and induced sputum examination. nNO and eNO were measured before the challenge and at 30min, 6h and 24h after challenge.

**RESULTS:** Flour SIC induced significant changes in nasal volume and FEV<sub>1</sub> in the early-phase of the challenge. A significant increase in eosinophils in nasal lavage and induced sputum was observed at 6h after challenge. Levels of nNO and eNO were constant during control SIC. After flour SIC, nNO decreased from 42.3 ppb $\pm$ 23.6 at baseline to 33.1 ppb $\pm$ 13.1 at 30min ( $p=0.07$ ); then, nNO increased to 46.5 ppb $\pm$ 24.0 at 6h and up to 56.5 ppb $\pm$ 42.6 at 24h ( $p=0.16$ ). After flour SIC, eNO decreased from 26.8 ppb $\pm$ 42.6 at baseline to 24.0 ppb $\pm$ 36.9 at 30min; then, gradually increased to 34.0 ppb $\pm$ 54.7 at 6h ( $p=0.2$ ) and up to 66.9 ppb $\pm$ 98.0 at 24h ( $p=0.03$ ).

**CONCLUSIONS:** A portable NO analyser appears useful for detecting nasal and bronchial responses associated to the late-phase reaction after allergen challenge. nNO kinetics during challenge early-phase may be altered by a marked nasal congestive response with obstruction of sinus ostia.

### 196 Increased IL-5 And IL-13 Cytokine Levels In Ex Vivo Stimulated Whole Blood Cells From Grass Pollen Allergic Donors Correlates With Seasonal Severity Of Pollen Exposure

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**RATIONALE:** There is an urgent need for a simple and physiological assay that differentiates between allergic and non-allergic individuals and predicts efficacy of anti-allergic interventions.

**METHODS:** Whole blood samples from 17 subjects (12 grass pollen allergic and 5 non-allergic) were obtained before the start (April) and during the peak of the grass pollen season (June). The investigators were blinded to the allergic status of the subjects. Cytokines (IL-5, IL-13, IL-10, IFN $\gamma$ , IL-12p70) and activation of T lymphocytes was determined after *ex vivo* culture of whole blood cells with different mitogens ( $\alpha$ Cd2/ $\alpha$ Cd28, LPS, grass pollen). The effect of a probiotic strain *Lactococcus lactis* NCC 2287 was also evaluated *ex vivo* on whole blood cells.

**RESULTS:** The whole blood assay had a positive predictive value (PPV) of 100% and a negative predictive value (NPV) of 50% compared to the Skin prick test (SPT). IL-5 and IL-13 cytokines were significantly elevated in allergic individuals during the peak of season ( $p=0.001$ ) compared to the start. There were no differences in IFN $\gamma$  levels. Co-culture of a candidate probiotic strain *Lactococcus lactis* NCC 2287 with whole blood cells induced IL-12p70 and significantly elevated IFN $\gamma$  levels in line with our previous observations.

**CONCLUSIONS:** Using small quantities of whole blood we have accurately predicted the allergic status of subjects and observed significant differences in IL-5 and IL-13 cytokine levels during the seasonal exposure. We have also validated the anti-allergic profile of a candidate probiotic strain *Lactococcus lactis* NCC 2287.