Editorial: Innovative steps toward understanding sinonasal disease, improving diagnostics and optimizing patient care

The September issue of the American Journal of Rhinology and Allergy includes a variety of original research publications and review articles which serve to expand our knowledge of disease and physiology, identify novel concepts in disease diagnosis and management, and encourage us to welcome a multidisciplinary approach to patient care.

Innovative scientists lead the way toward new treatments and interventions for our patients suffering from chronic rhinosinusitis (CRS). Lee and Cohen1 provide a comprehensive review article regarding the newly identified solitary chemosensory cell (SCC) and the potential immunomodulating role of taste receptors expressed by these cells. They describe evidence that activation of bitter taste receptors (T2Rs) expressed in the sinonasal cavity induces secretion of antimicrobial peptides. One isoform, T2R38, detects quorum-sensing molecules from gram-negative bacteria, activating production of nitric oxide. Sweet taste receptor (T1R2/3) activation by physiologic glucose attenuates this T2R response. This fascinating review identifies potential new targets for therapeutic development and possible genetic markers of disease phenotype.

Chitosan-dextran (Chitodex) gel has been used as an anti-hemostatic and anti-adhesive agent following endoscopic sinus surgery, however the mechanism underlying the effect of Chitodex on wound healing, inflammation, and biofilm formation is not well understood. Paramisivan and colleagues2 studied the in vitro effect of Chitodex on human nasal fibroblasts. Chitosan or dextran-treated cells showed reduced interleukin (IL)-8 expression after staphylococcal toxin challenge, reduced fibroblast proliferation, and anti-biofilm properties, suggesting a cellular mechanism by which this therapy may provide clinical benefit.

Banglawala et al3 studied the use of intraoperative hydrodebrider sinus irrigation (HSI) during endoscopic sinus surgery upon postoperative inflammatory markers and clinical outcomes. Twelve patients with symmetric CRS were randomized to HSI on one side with the other side serving as internal control. Subsequent symptom and endoscopic scoring showed that HSI had no impact upon postoperative outcomes. Although HSI significantly decreased IL-17a cytokine levels in the mucus at 1 and 3 months postoperatively, this effect was not seen for TNF-alpha, IL-6, or IL-10.

In an effort to further understand the role of innate immunity in the pathogenesis of CRS, Detwiler et al4 performed quantitative real time polymerase chain reaction on ethmoid mucosal samples of CRS patients with (CRSwNP) and without (CRSsNP) nasal polypos. Both CRSwNP and CRSsNP samples demonstrated lower expression of toll-like receptor-2 compared with controls, and CRSsNP samples demonstrated higher levels of interleukin-22 receptor compared with controls. These data suggest that differences in microbial recognition and immune regulation may contribute to the development of CRS.

Next, three studies explored the variable but significant relation negatively impacts quality of life,11 Lee et al10 assessed 40 patients with recalcitrant CRSwNP for atopy and pulmonary disease. Asthma was diagnosed in 26 patients (65%), a new diagnosis for a quarter of the patients. Atopy was not significantly associated with CRSwNP or asthma. Finally, in a novel study, Deniz and colleagues10 quantified mucociliary dysfunction, as measured by saccharin test, in patients with varying degrees of obstructive sleep apnea syndrome. They found that severe obstructive sleep apnea patients had significant deterioration in nasal mucociliary dysfunction when compared with control patients, putting this group at risk for sinonasal infection.

The importance of dust mite antigen in allergic rhinitis is further highlighted by an article by Wang et al8 This group examined household exposures in fifty patients with AR. Dust samples were taken from bedding of each patient, in winter and summer seasons, and measured for the presence of the major antigens Der p 1 and Der f 1. High levels of dust mite antigen were found in 44% of bedding samples. Interestingly, the levels of dust mite antigen in these samples did not fluctuate significantly between seasons, but were significantly correlated with age of the mattress and pillow. Further, the level of dust mite antigen correlated with severity of nasal itching.

Wang et al10 sought to determine the prevalence of uncontrolled AR and severe chronic upper airway disease (SCUAD) in a prospective cohort study. Patients who met criteria for uncontrolled symptoms were more likely to have recently used antibiotics for respiratory infection, note disturbance in sense of smell, and be smokers. This study highlights the utility of simple tools in the assessment of symptom severity and control. Further, it underscores the correlation between allergic rhinitis and comorbid disease. As olfactory dysfunction negatively impacts quality of life,11 Lee et al11 studied long term prognosis of postviral olfactory dysfunction. Although the recovery rate to subjective normosmia was 31.7%, over 85% of patients noted improvement over time.

Two papers in this issue address challenges of diagnosing AR, particularly when selecting diagnostic modality and appropriate patients for immediate hypersensitivity testing. Cho et al6 assessed 40 patients with chronic rhinitis compared with asymptomatic non-atopic controls. They compared immediate hypersensitivity skin testing (skin “prick” testing, SPT), individual specific serum IgE levels via ImmunoCap assay, and a Multi-allergen serum IgE assay (MAST) against 10 common allergens. The two serum tests correlated well for most of the tested allergens. There was an 81–97% agreement between SPT and ImmunoCAP, 80–98% agreement with SPT and MAST. Notably,
the control patients had low positive results to a variety of allergens as measured by serum test, despite negative SPT results and absence of clinical symptoms. This supports the importance of clinical judgment in determining which diagnostic test is appropriate for each patient so as to minimize false positive results. Further addressing this issue, Lacagnina and colleagues analyzed characteristics of patients with chronic nasal symptoms in a large clinical database. Through logistic regression and receiver operating characteristic analysis, the group found that certain clinical characteristics such as relation of symptoms to allergen or outdoor exposure, exposure to pets, presence of sneezing, conjunctivitis, and nasal pruritus or improvement with antihistamine therapy identified patients more likely to have positive SPT. This tool was then validated in a separate database. The use of decision support tools to select patients likely to benefit from diagnostic testing can potentially impact health care expenditure as well as patient care.

As the population of patients suffering from AR ages, documenting the safety and efficacy of AR therapy in an elderly group becomes increasingly important. Bozek et al14 performed an international study on 505 patients from Croatia, Romania, Italy, Russia and Turkey to identify types of septal deformity as determined by rhinoscopy and computed tomography. Type 3 deformity, a vertical edge of sinonasal structures, than other regions of the nasal cavity, suggesting that this region serves a specialized function. A review article of respiratory epithelial adenomatoid hamartoma (REAH) features and treatment outcomes by Nguyen et al16 reports that REAH is a relatively common finding in nasal polyposis, may contribute to olfactory dysfunction, and endoscopic resection of this tissue can improve nasal obstruction and sense of smell.

As clinicians seek to continually improve quality and safety for their patients, this issue contains three articles addressing these concerns. ElBadawey et al18 sought to assess the impact of three frontal sinus procedures – balloon sinuplasty, frontal recess clearance, or endoscopic modified Lothrop procedure – on quality of life as measured by the Glasgow Benefit inventory and SNOT22 questionnaires. This group found significant symptom and quality of life benefit from all three frontal sinus procedures.

Augmented-reality surgical navigation systems may negatively impact surgeons’ intraoperative attention. In a study involving experienced otolaryngology surgeons, Dixon et al19 assessed the effect of providing augmented reality navigation on a sub-monitor with a standard endoscopic monitor, compared to a single display. They documented a significant reduction in inattentive blindness, as measured by detection of unexpected findings, in the group using surgical navigation on a sub-monitor.

Finally, advances in medical imaging may help distinguish malignant from benign sinonasal lesions. Taha et al20 prospectively evaluated the role of apparent diffusion coefficient (ADC) of diffusion-weighted magnetic resonance imaging (DW-MRI) in this process. They found that adding DW-MRI increased sensitivity, specificity, negative and positive predictive values for differentiating between benign and malignant processes, encouraging the use of this modality in workup of sinonasal tumors.

In summary, this issue will challenge us all to critically assess what we know, to identify knowledge gaps in diagnostics and treatment, to seek interdisciplinary collaboration to improve patient care, and to continually reassess the quality of the care we are providing to our patients.

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