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A call for critical examination of endoscopically-guided cultures in chronic rhinosinusitis

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Cultivation-based detection of bacterial organisms is inherently biased [1]. The collection of culture media, environmental conditions, and nutrient supplementation select for the growth of metabolically active bacteria that prefer the afforded environment. Even in the most broad of media and conditions, many bacteria still do not grow. Newer culture-independent methods have been more accurate in the detection of bacteria, and have begun to define the many distinct organisms that comprise a “community of bacteria” that may function in an interrelated fashion. A recent study by Hauser et al has gone so far as to quantify the weakness of culture in chronic rhinosinusitis (CRS) [2]. In this study, the authors noted that the dominant bacteria was picked up by culture only 47% of the time and that organisms identified on culture represented only a small subset of those actually present. Through the use of culture independent microbial detection techniques in recent years, it has also become apparent that anaerobes also deserve attention, as these organisms are notoriously difficult to grow in culture but are frequently a large portion of the bacterial community composition in CRS.

In addition, the cost of clinical cultures must be considered. Initial direct clinic costs may include the physician visit and endoscopy, as well as personnel for specimen handling. However, more significant cost burden is brought about by specimen transport, culture and susceptibility testing including storage and media, and the personnel required. Although this is seemingly straightforward, current charges are actually determined by the type of cultures requested (aerobic, anaerobic, mycobacterial, fungal, susceptibility, etc), and number of isolates reported.

An important—and unanswered—question is if endoscopically-derived cultures actually help select antibiotics that are more effective than those that may be empirically chosen, or in which situations this test is called for. The broader question has been raised if antibiotic therapy even works at all in chronic rhinosinusitis, or in which scenarios it may be beneficial [3]. As a “routine” part of medical therapy in CRS, antibiotic use can be debated, however in acute exacerbations of CRS (AE-CRS) there is a likelihood for acute bacterial overgrowth and in this situation antibiotics are often utilized. Perhaps endoscopically-guided cultures may be most rationally argued in setting of visible purulence when prior empiric antibiotic

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therapy has failed. The justification in this setting is for cultures to provide sensitivity information to appropriately select an antibiotic, given the high rate of resistance in this population [4,5]. In routine CRS or AE-CRS, the preferential use of endoscopically-guided cultures to guide antibiotic selection has not been compared to empiric therapy based on guidelines or local antibiotic resistance patterns. In the current “community as pathogen” model, there may also be a resistance offered by a pathogen in the community that is not identified through culture of a single isolate. As such, it is not clear that cultures truly offer this presumed information (ie, testing *in vivo* antibiotic resistance), and perhaps molecular analyses of the sample may prove more reliable in the future. Two groups have reported that utilizing endoscopically guided cultures changed the choice of antibiotic in 66–77% of the time [6,7]. But, currently there are no data examining the additional benefit conferred by culture-directed antibiotic use over empiric antibiotic selection in CRS.

These issues call for a critical re-examination of the use of endoscopically-guided cultures in chronic rhinosinusitis. There is a surprising lack of clarity on this topic in current sinusitis guidelines and major consensus statements. In the recent ICARS consensus statement [8], as well the 2007 AAO-HNS sinusitis guidelines and 2015 update [9], and the EPOS [10] document, the appropriate or effective use of cultures in chronic rhinosinusitis remains unaddressed. A better understanding into the role of sinus culture in particular scenarios, evidence for improved outcomes, cost-benefit analysis, and consideration of incorporation of new technologies into this arena is a necessary venture.

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