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Variability of fungi detection in the respiratory tract of racehorses according to the sampling site

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INTRODUCTION

- The clinical relevance of colonization of equine airways by fungi is unclear.
- Diagnosis of fungi in the respiratory tract is fastidious and there is no method of reference.

OBJECTIVES

- To characterize fungi from upper and lower airways of racehorses
- To determine the most reliable methodology for fungal detection

HYPOTHESIS

- Fungal cytology of a pooled BAL (BAL_P) is representative of corresponding left (BAL_L) and right (BAL_R) samples.

METHODS

- 30 Standardbred racehorses in active training, aged 4.6 ± 1.6 years, from 3 different training stables
- TW, followed by BAL from each lung separately, collected through a guarded catheter and gastroscope

- Fungi detection, identification and characterization by cytology and culture
 - Positive culture: ≥ 1 mold identified
 - Positive cytology: ≥ 1 fungal element (hyphae, spore) observed

RESULTS

- Fungal culture (Table 1)
 - TW: 28/30 (93%) positive
 - BAL_P: 4/30 (13%) positive → All positive in TW, 3/4 with same fungi
 - 9 genus (alone or concomitant) : *Aspergillus* (5 genus) 13/28 (46%), *Penicillium* 12/28 (43%)

Table 1: Identification of fungi in horses with a positive BAL_P culture

| Case number | 9 | | 17 | | 18 | | 21 | |
|----------------------|----|------------------|----|------------------|----|------------------|----|------------------|
| | TW | BAL _P | TW | BAL _P | TW | BAL _P | TW | BAL _P |
| <i>A fumigatus</i> | | | | | | | | x |
| <i>A nidulans</i> | x | | x | x | x | | | |
| <i>A versicolor</i> | | | | | | | | x |
| <i>Penicillium</i> | x | | x | | x | x | x | x |
| <i>Aureobasidium</i> | | x | | | | | | |
| <i>Chrysosporum</i> | x | | | | | | | |

Table 2: Cytology of pooled and individual BALF, and of TW

| | Cytology positive | Spores | Hyphae | Phagocyted |
|------------------|-------------------------------------|--------|--------|------------|
| TW | 22/30 | 18/22 | 16/22 | 14/22 |
| BAL _P | 7/30 3 bilateral 4 unilateral | 7/7 | 2/7 | 6/7 |
| BAL _R | 8/30 | 5/8 | 6/8 | 5/8 |
| BAL _L | 7/30 | 7/7 | 0/7 | 6/7 |

Comparison of sample sites (Table 3)

- Poor agreement between BAL_L and BAL_R
- Poor agreement between culture and cytology
- BAL_P vs separate lungs:
 - Not equivalent (p = 0.025 by McNemar Test)
 - Sensitivity = 0,58 ; Specificity = 1,00

Fungal cytology (Table 2)

- TW: 22/30 (73%) positive ; 12/22 (55%) with both spores and hyphae, frequently phagocyted
- BAL: Large disparity between lungs

Table 3: Comparison of BALF sample sites, and of BALF methods of analysis

| | BAL _L only | BAL _R only | BAL _{L+R} | Agreement (κ) |
|------------------|-----------------------|-----------------------|--------------------|---------------|
| Cytology | 4/7 | 5/8 | 3 | 0,015 |
| | Culture only | Cytology only | Culture + cytology | Agreement (κ) |
| BAL _P | 3/4 | 6/7 | 1/7 | 0,015 |

DISCUSSION

- Despite a similar prevalence of fungi detection in left and right BAL, a large disparity was found between lungs on cytology.
- Detecting fungi by cytology on either BAL_P or BAL_L + BAL_R was not equivalent

CONCLUSION

Pooled BAL is a highly specific while fairly sensitive alternative to combined cytology of individual left/right samples for mold/fungi detection.