**Ciliary functional analysis: Beating a path towards standardization**

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**Résumé:**

**Introduction:**

Primary ciliary dyskinesia(PCD) is an inherited disorder in which respiratory cilia are stationary, or beat in a slow or dyskinetic manner, leading to impaired mucociliary clearance and significant sinopulmonary disease. One diagnostic test is ciliary functional analysis using digital high speed video microscopy(DHSV), which allows real time analysis of complete ciliary function, comprising ciliary beat frequency(CBF) and beat pattern(CBP). However, DHSV lacks standardization, and is currently not evidence based1.

**Methods:**

A literature search was performed using the electronic database PubMed. Publications which reported DHSV use for ciliary functional analysis, including the processing and analysis of respiratory ciliated epithelial samples, reference ranges, scoring systems and criteria for the evaluation of ciliary function, were identified and reviewed.

**Results:**

The data were used to generate a standardized protocol for ciliary sample collection and processing:

* Ciliated samples should be obtained by brushing of the inferior nasal turbinate with a bronchoscopic cytology brush, without use of anesthetic agents.
* Ciliary functional studies should be conducted at 37°C, with high humidity.
* A microscope at x10000 magnification should be used, with control of temperature and humidity, using medium buffered with HEPES to maintain pH balance, with addition of antibiotics and antifungal agent, and processed within 3 to 9 hours of sampling. For ciliary functional analysis, only undisrupted epithelial ciliated edges >50 μm in length, should be used. A minimum of 5 sideways edges should be examined for CBF, with an additional from above edge for CBP. A DHSV camera capable of recording at 400fps with a digital storage device should be used for functional assessment.
* CBF should be determined manually by the time required for a group of cilia to complete a minimum of 5 ciliary beat cycles.

In addition, classification and definitions for the different normal and abnormal CBPs, and a quantitative CBP evaluation system have been proposed. The data were used to identify gaps needed to complete the evidence based for DHSV.

**Conclusions:**

Consensus statements and standardized protocols for DHSV and ciliary functional analysis need to be established, and utilized to redefine standard normal data and minimal diagnostic standards for PCD. This will not only help in improving the diagnosis of PCD but allow DHSV to be used as a research outcome measure. The next step is to bring together an international expert panel to validate the proposals presented and tackle the research questions.

**Mot clé:**

Infection-Inflammation

**Lien d’intérêt:**

Les auteurs n’ont aucun conflit d’intérêts réel ou perçu, en relation avec ce résumé

**Références:**

1. *Eur Respir J*. 2017;49:ERJ-01090-2016.