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Functional respiratory imaging provides novel insights into the long-term respiratory sequelae of bronchopulmonary dysplasia

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This study assesses respiratory outcomes in adolescents born preterm. BPD patients had impaired lung function. FRI showed higher distal airway resistances and more air trapping in the BPD group and seems to be a more sensitive emerging imaging technique. <https://bit.ly/2KzZytp>

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ABSTRACT

Rationale: Bronchopulmonary dysplasia (BPD) is a common complication of preterm birth. Lung function and imaging are classically used to assess BPD. Functional respiratory imaging (FRI) combines a structural and functional assessment of the airways and their vasculature. We aimed to assess BPD using FRI and to correlate these findings with the clinical presentation.

Methods: We included 37 adolescents with a history of preterm birth (22 BPD cases and 15 preterm controls). The study protocol included a detailed history, lung function testing and computed tomography (CT) (at total lung capacity (TLC) and functional residual capacity (FRC)) with FRI. CT images were also assessed using the Aukland scoring system.

Results: BPD patients had lower forced expiratory volume in 1 s to forced vital capacity ratio ($p=0.02$) and impaired diffusion capacity ($p=0.02$). Aukland CT scores were not different between the two groups. FRI analysis showed higher lobar volumes in BPD patients at FRC ($p<0.01$), but not at TLC. Airway resistance was significantly higher in the BPD group, especially in the distal airways. Additionally, FRI showed more air trapping in BPD patients, in contrast to findings on conventional CT images.

Conclusion: This study is the first to use FRI in research for BPD. FRI analysis showed higher lobar volumes in BPD patients, indicating air trapping and reduced inspiratory capacity. In contrast to Aukland CT scores, FRI showed more air trapping in the BPD group, suggesting that FRI might be a more sensitive detection method. Importantly, we also showed increased distal airway resistance in BPD patients. By

combining structural and functional assessment, FRI may help to better understand the long-term sequelae of BPD.