They are frequently multiple and bilateral, and present at a mean age of 50.7 yrs [7]. The most common histological subtypes are hybrid oncocytic (50%) and chromophobe (34%) renal cell carcinoma, while clear cell, oncocytoma and papillary renal cell cancer are less frequently found [7]. Radiographic screening is recommended, with a typical strategy involving abdominal computed tomography and/or renal ultrasound at the time of diagnosis, followed by interval screening every 3–5 yrs [8]. Parenchyma-sparing surgery is recommended given the risk of development of further tumours [7]. In line with these recommendations, all participants in the study by FRÖHLICH *et al.* [1] were screened for kidney manifestations by abdominal ultrasound and none were identified.

The importance of recognising the possibility of a diagnosis of Birt–Hogg–Dubé syndrome in patients with familial recurrent pneumothorax, with or without characteristic skin findings, lies in undertaking surveillance for renal tumours, a potentially lethal feature of this syndrome.

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STATEMENT OF INTEREST

None declared.

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Impulse oscillometry in comparison to spirometry in pregnant asthmatic females

To the Editors:

Asthma complicates 3–8% of pregnancies [1, 2] and early diagnosis and optimal management of the condition seems necessary. However, spirometry as a clinical measure of airway disease mainly depends on subjects efforts during forced expiratory manoeuvres. Considering the high prevalence of respiratory symptoms and breathlessness in pregnancy and the limited functional capacity and mobility of the diaphragm because of the growing foetus [3], an easier, more rapid screening test that does not require patient cooperation would be ideal. Our study aimed to evaluate the correlation between spirometry and impulse oscillation technique (IOS) parameters to reveal the utility of IOS parameters in diagnosis of airflow obstruction in pregnant females.

In total, 125 pregnant females were categorised in three groups of asthmatics: 1) 40 physician-diagnosed asthmatics, on the basis of National Asthma Education and Prevention Program guidelines [4]; 2) 35 probable asthmatics, with symptoms and signs of asthma but normal spirometry; and 3) 50 healthy controls without any signs and symptoms of asthma and with normal spirometry. After obtaining informed consent, baseline IOS and spirometry measurement, salbotamul (two puffs, 200 μg) was administered by a metered-dose inhaler *via* a spacer device. All tests were performed again 15 min later.

As predicted, at baseline, forced expiratory volume in one second (FEV1) was significantly lower in the asthmatic group compared with the probable asthmatics and healthy subjects. Forced vital capacity (FVC) was significantly lower and impedance at 5 Hz (Z5), resistance at 5 Hz (R5) and resonant frequency (Fres) were significantly higher in asthmatics compared with healthy subjects. Resistance at 20 Hz (R20) did not differ between the three groups.

In the asthmatic group, FEV1 and FVC significantly increased after bronchodilator use and Z5, R5 and R20 significantly decreased after bronchodilator use. In asthmatics and probable asthmatics, there was a 15–20% decrease in Z5, R5 and R20 after bronchodilator administration (table 1). However, in some of the healthy subjects a small bronchoconstriction after bronchodilator administration was observed but it was not significant ($p>0.05$).

To our knowledge, this is the first study to report the comparison of IOS values to spirometric values in pregnant

TABLE 1 Relative lung function parameters measured by spirometry and impulse oscillation technique at baseline and after bronchodilator administration

Parameters	Asthmatic group	Probable asthmatic group	Control group	p-value
Baseline				
FEV_1 % pred	83.87 (78.85–87.67)	96.37 (91.34–101.39)	96.44 (93.83–98.60)	<0.0001
FVC % pred	91.31 (85.84–96.78)	97.64 (89.87–105.40)	101.31 (96.77–105.84)	0.02
Z5 %	165.75 (146.75–184.76)	134.93 (114.41–155.43)	135.47 (122.99–147.95)	0.01
R5 %	158.55 (141.20–175.89)	129.68 (109.05–150.32)	131.61 (117.14–146.09)	0.02
R20 %	127.71 (113.79–141.63)	124.50 (105.94–143.06)	127.70 (116.09–139.30)	0.99
F_{res}	19.40 (17.41–21.40)	16.93 (15.19–18.67)	16.64 (15.39–17.89)	0.03
Post-bronchodilator				
FEV_1 % pred	89.88 (85.66–94.10)	86.86 (77.05–84.37)	89.44 (84.37–94.50)	NS
FVC % pred	96.22 (92.59–99.86)	90.41 (78.74–102.09)	90.88 (80.81–100.95)	NS
Z5 %	135.50 (119.44–151.57)	113.95 (81.00–146.90)	122.58 (95.45–149.71)	NS
R5 %	128.36 (113.41–143.31)	110.45 (79.40–141.51)	117.24 (88.13–146.35)	NS
R20 %	112.80 (99.27–126.34)	102.20 (74.44–129.95)	117.34 (85.97–148.70)	NS
F_{res}	17.38 (15.46–19.29)	15.52 (11.77–19.28)	14.00 (12.47–15.52)	NS

Data are presented as lung function parameters % predicted (% pred) mean (95% confidence). FEV_1: forced expiratory volume in one second; FVC: forced vital capacity; Z5: impedance at 5 Hz; R5: resistance at 5 Hz; F_{res}: resonant frequency; NS: not significant

asthmatic females. Previous studies have proposed that a decrease of 20–40% or >40% in R5 following bronchodilator use can be considered for a reliable diagnosis of asthma [5–7]. We suggest that a 15–20% decrease in impedance and resistance at 5 Hz to be taken as a bronchodilator response in pregnancy. A lower decrease after bronchodilator administration in pregnancy could be due to a reduced total pulmonary resistance and increased airway conductance in pregnancy. We also suggest that baseline and post-bronchodilator responses of Z5 and R5 could be the best IOS parameters for asthma detection in pregnancy.

Our study showed that impulse oscillation technique as a noninvasive and quick method could be used as an appropriate alternative in the screening of pregnant females for asthma. The unique value of this technique in terms of short-term response to therapeutic challenge [8], especially in symptomatic patients with normal spirometry, should be considered as well. It should be remembered that the measurement of respiratory impedance does not enable the distinction between obstructive and restrictive lung disorders [9]. Further investigations are needed to establish well defined reference values and reversibility criteria. It is better to account for foetal sex as well, because some studies suggest that foetal sex could affect asthma and airway lability [10]. Thus, it may also have an affect on lung function tests and bronchodilator responses.

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STATEMENT OF INTEREST

None declared.

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