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**Title:** Relationship between patient pulmonary function, exercise capacity and quality of life in chronic obstructive pulmonary disease (COPD)

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**Body:** Background: Six minute walk testing (6MWT) and spirometry predict survival & morbidity in COPD. Impulse oscillometry (IOS) is superior to spirometry in predicting patient reported outcomes in COPD. The aim of this cross sectional study was to explore the relationship between spirometry, IOS and airways resistance using the interrupter technique (RINT) versus 6MWT and health related quality of life (HQOL). Methods: Thirty-two (20 male) patients mean age 66yrs with COPD completed forced expiratory volume in 1 second (FEV1), IOS, RINT, 6MWT (with measurement of walking distance and desaturation) and St George's respiratory questionnaire (SGRQ). Spearman's rank correlation was used to examine the relationship between the measurements. Results: Peripheral and small airways resistance and RINT were associated with 6MWD and desaturation.

Correlation Co-efficients for pulmonary function vs disease activity

| Pulmonary function measure |                  | 6 minute walk distance | Change in oxygen saturation | St George's questionnaire activity score |
|----------------------------|------------------|------------------------|-----------------------------|--|
| Spirometry                 | FEV1             | 0.50                   | 0.62                        | -0.39                                    |
|                            | FEV1 % predicted | 0.25                   | 0.7                         | -0.39                                    |
| Impulse Oscillometry       | R5               | -0.46                  | 0.54                        | 0.51                                     |
|                            | R20              | -0.29                  | 0.58                        | 0.42                                     |
|                            | R5-R20           | -0.49                  | 0.52                        | 0.45                                     |
| Interrupter technique      | Rint             | -0.47                  | 0.63                        | 0.41                                     |

total (R5) central (R20) small (R5-20) airways resistance

IOS outcomes were more strongly associated with St George's activity score than FEV<sub>1</sub> or RINT. Other

components of SGRQ were not correlated with any physiological measures evaluated. Conclusion: Although IOS was better than spirometry at predicting HRQOL; IOS and RINT were no better at predicting 6 minute walk distance than FEV1 and were inferior to FEV<sub>1</sub>% predicted at predicting 6 minute walk desaturation.