

The Effects Of Chronic Rhinosinusitis On Sniff Inspiratory Muscle Strength

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Introduction

Most chronic rhinosinusitis (CRS) patients experience reduced quality of life characterized by symptoms such as chronic nasal congestion, facial pain, purulent sinonasal drainage, altered sense of smell and difficulty breathing through the nose.

In the absence of concomitant respiratory condition(s), the effects of CRS on inspiratory muscle strength are poorly understood.

Our objective in this research is to investigate sniff nasal inspiratory ability among subjects with CRS and compare our results with previous reports on healthy subjects.

Methods and Materials

As part of an ongoing National Institutes of Health grant, 18 (10 males, 8 females) adult subjects (24-73 years; mean 53 years) with either unilateral or bilateral CRS without nasal polyps were selected for this pilot study.

Sniff measurements were collected using the LifeShirt[®] system (VivoMetric, San Diego, CA); a vest-like garment worn by subjects that records breathing parameters via respiratory inductive plethysmography.

Sniff was measured unilaterally by instructing subjects to close their contralateral nostril with their finger and then sniff gently.

Results

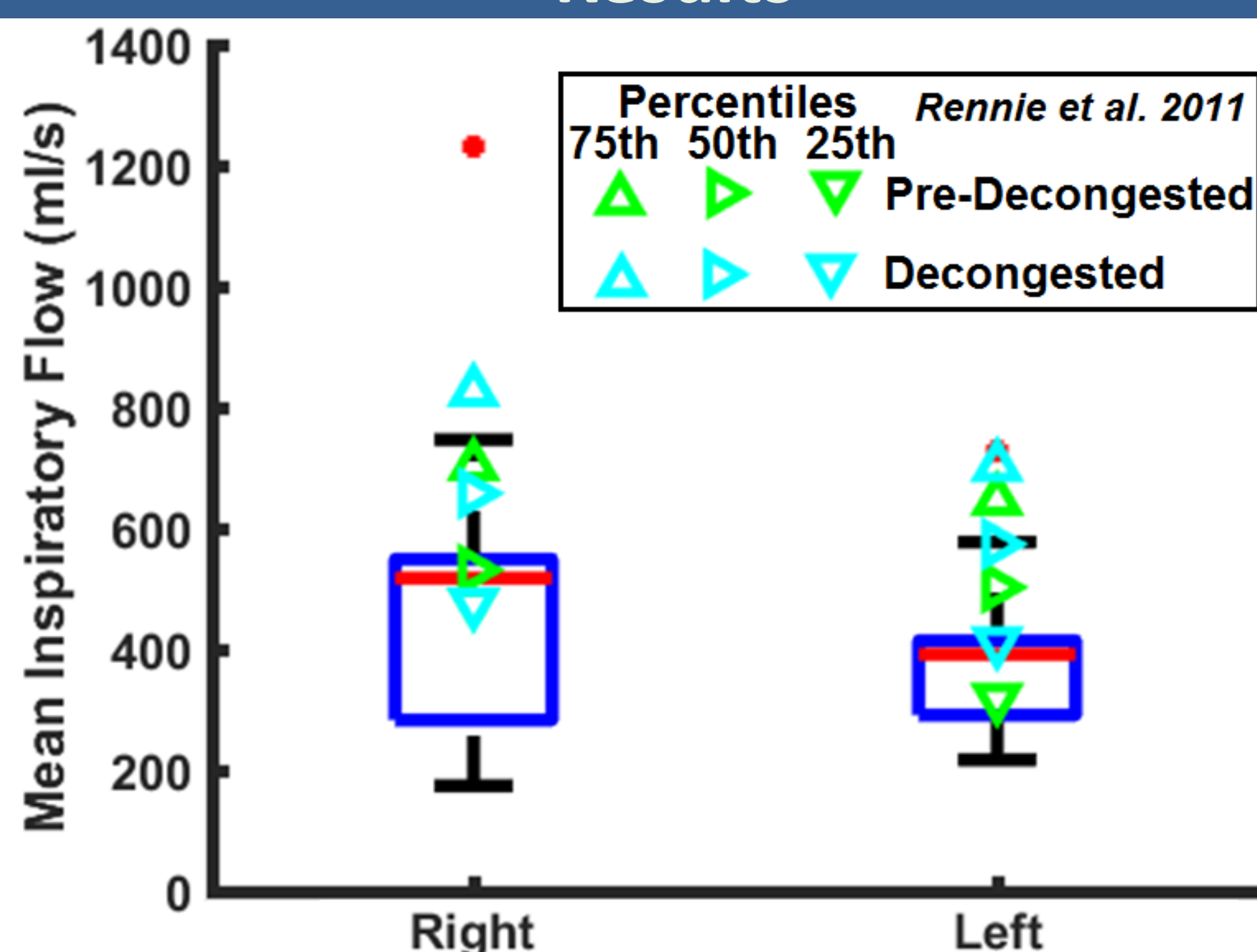


FIGURE 1. Boxplots describing unilateral mean inspiratory flow rate during sniffing across all CRS patients. Triangles overlaying the boxplots are percentiles of mean plateau flow rate from 14 healthy subjects (21-38 years; 6 males, 8 females) reported in the article by Rennie and colleagues.¹ Green triangles represent baseline flow rate percentiles (25th, 50th & 75th) before subjects were decongested. Cyan triangles represent flow rate percentiles after subjects were decongested with 2 sprays of 0.1% xylometazoline topically administered at each nostril. The boxplot whiskers show 1.5 times the interquartile range (blue box) and outliers are depicted with red dots.

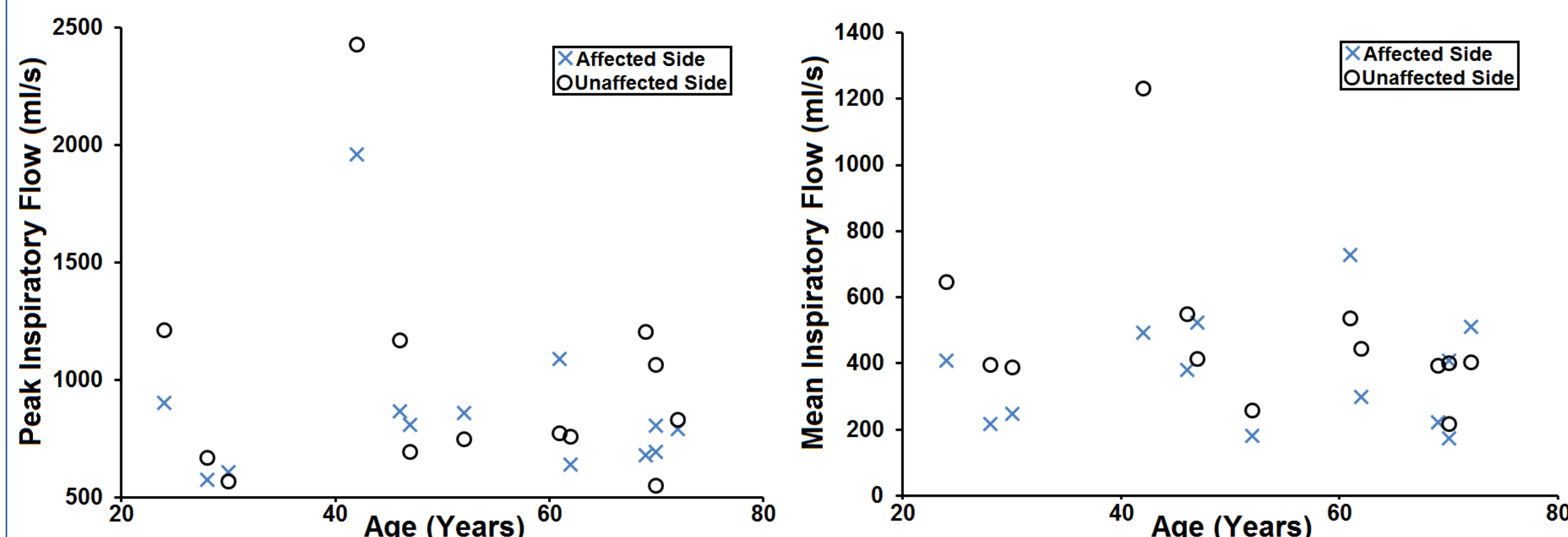


FIGURE 2. Peak inspiratory (LEFT) and mean inspiratory (RIGHT) flow rates by age from CRS subjects' predominately affected side (AS) and less affected side (NAS). Plots do not demonstrate any obvious age related changes in flow rates from AS and NAS. Similarly, flow rates in AS and NAS were not very different.

Results

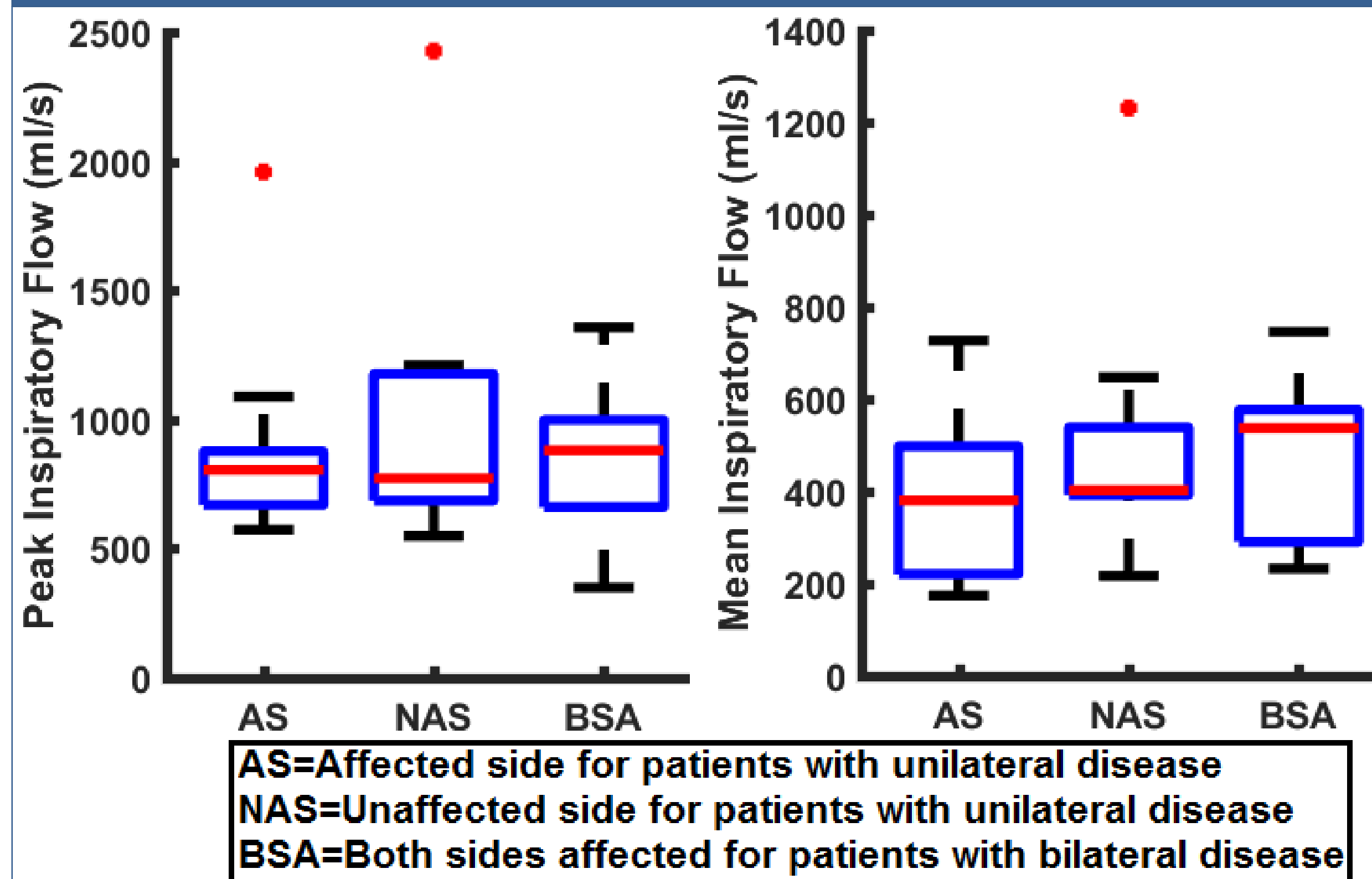


FIGURE 3. Peak inspiratory (LEFT) and mean inspiratory (RIGHT) flow rates comparisons between CRS subjects with unilateral and bilateral diseases. Median peak flow (red line) was slightly lower on NAS than AS and BSA, while peak flow interquartile range (blue box) was greater NAS than AS and BSA. Median mean flow was highest on BAS. Peak and mean inspiratory flow rates on NAS were not different from AS and BAS. The boxplot whiskers show 1.5 times the interquartile range and outliers are depicted with red dots.

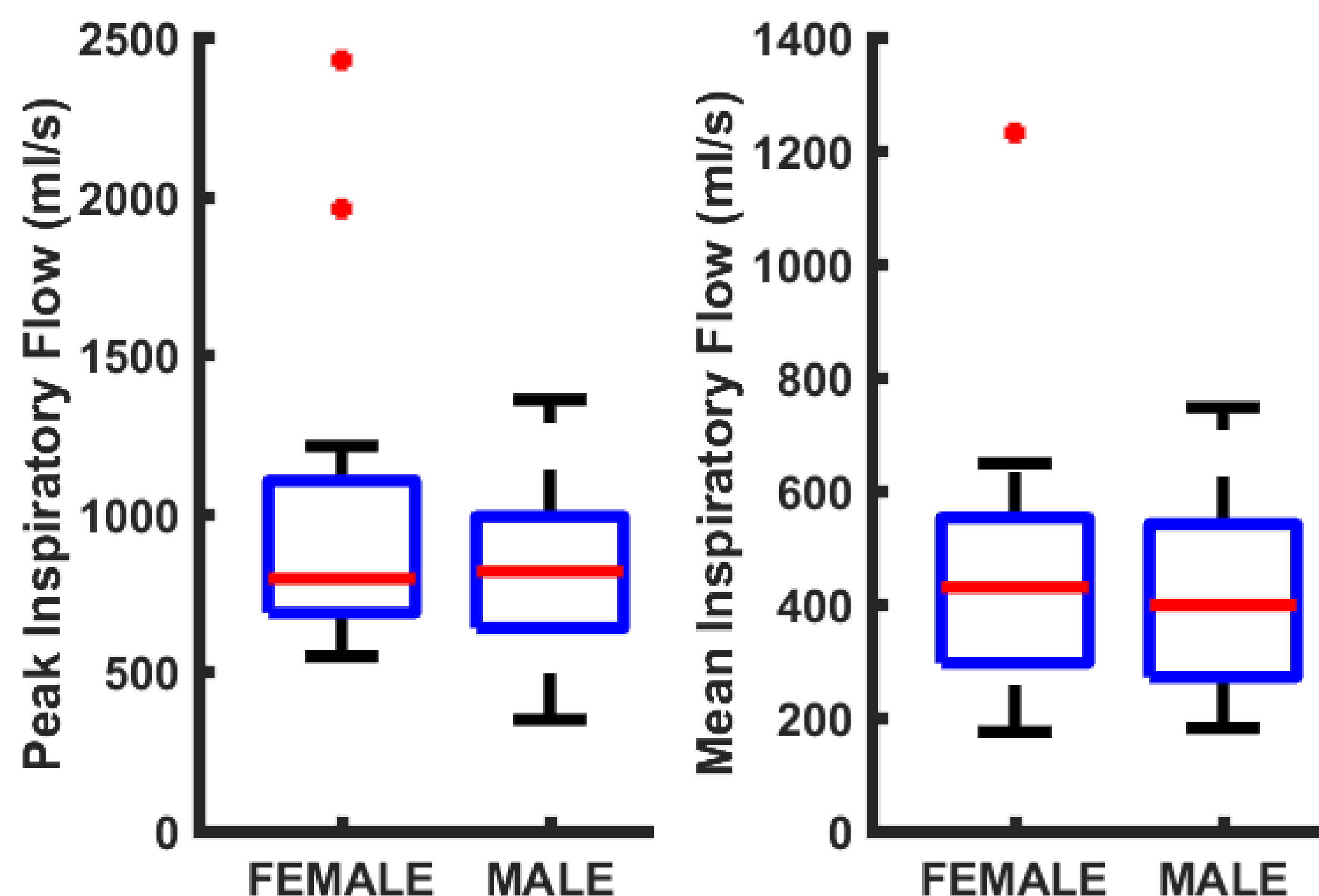


FIGURE 4. Peak inspiratory (LEFT) and mean inspiratory (RIGHT) flow rates comparisons between males and females with CRS. Median peak flow (red line) was marginally lower among females than males, but median mean flow was higher among females than males. Peak flow rate at the 75th percentile was higher in females than males while mean flow rate at the 75th percentile was basically no different between females and males. Mean flow interquartile range between females and males were identical.

Discussion

CRS subjects without concomitant respiratory condition(s) have sniff mean inspiratory flow profile that appeared slightly lower to mean plateau flow in healthy subjects.

For subjects with unilateral disease, peak inspiratory and mean inspiratory flow rates on the side with CRS were not considerably lower than on the contralateral side. In addition, CRS subjects with unilateral disease and subjects with bilateral disease had comparable peak inspiratory and mean inspiratory flow rates.

There was no evidence of age related decline in peak inspiratory and mean inspiratory flow rates among subjects with unilateral disease.

Gender did not influence peak inspiratory and mean inspiratory flow rates.

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References

- Rennie, C. E., Gouder, K. A., Taylor, D. J., Tolley, N. S., Schroter, R. C., & Doorly, D. J. (2011, March). Nasal inspiratory flow: at rest and sniffing. In *International forum of allergy & rhinology* (Vol. 1, No. 2, pp. 128-135). Wiley Subscription Services, Inc., A Wiley Company.