

Adaptive mechanical ventilation with automated minimization of mechanical power – a pilot randomized cross-over study

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- Additional File -

In this additional file, we present data on the correlation between tidal volume (V_T), driving pressure (ΔP_{stat}), mechanical power (MP) and the expiratory time constant (RC_e) during adaptive mechanical ventilation with selection of respiratory rate (RR) and V_T according to Otis' equation on least work of breathing (adaptive ventilation mode, AVM) and with automated minimization of inspiratory power (adaptive ventilation mode 2, AVM2) to highlight the influence of the dynamics of expiration on the automated optimization of mechanical ventilation with both modes.

We show a positive correlation between V_T and RC_e for both modes, which is more pronounced for AVM2 (Figure S1, left panel of the top and middle rows). As RC_e can be approximated by multiplying resistance with respiratory system compliance (C_{rs}), this is in line with our finding of a stronger correlation between V_T and C_{rs} with AVM2 when compared to AVM (main manuscript Figure 3).

There was no correlation between ΔP_{stat} or MP and RC_e both for AVM and AVM2 (Figure S1, middle and right panels of the top and middle rows).

When plotting the difference in V_T , ΔP_{stat} or MP between AVM and AVM2 against the average RC_e for both modes (Figure S1, bottom row), we found no significant correlation between the differences in these parameters and RC_e . Nevertheless, it appears that there might be a trend towards a stronger reduction in MP with AVM2 in patients with higher RC_e when removing one outlier who had a severe decrease in respiratory system compliance (C_{rs}) during ventilation with AVM2. This decrease in C_{rs} caused an increase in MP and ΔP_{stat} despite ventilation with lower V_T (Figure S1, middle and right panels of the bottom row).

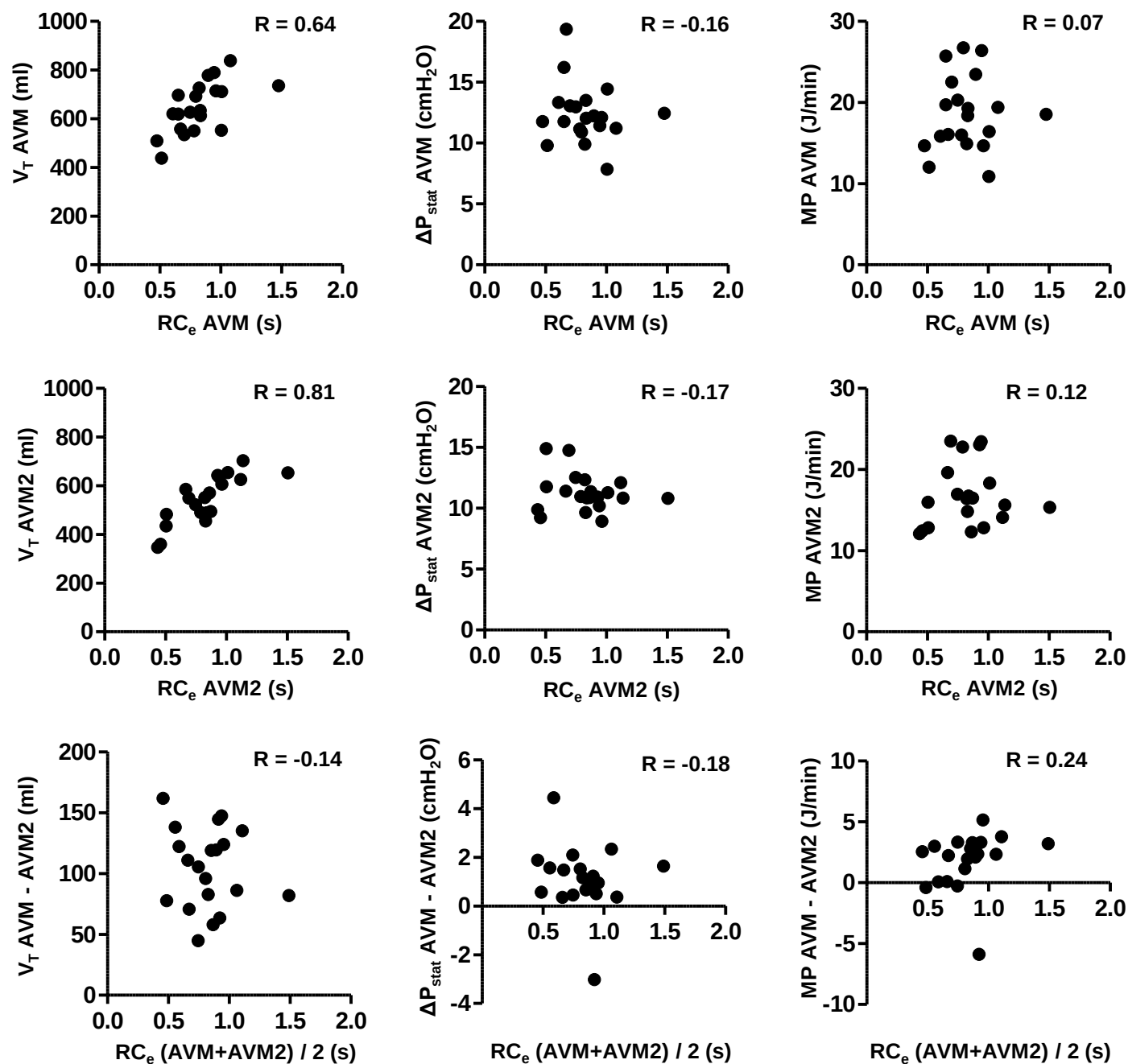


Figure S1. Correlation between tidal volume (V_T), driving pressure (ΔP_{stat}), mechanical power (MP) and the expiratory time constant (RC_e) during adaptive mechanical ventilation with selection of respiratory rate (RR) and V_T according to Otis' equation on least work of breathing (AVM, top row) and with automated minimization of inspiratory power (AVM2, middle row). Bottom row: Difference between AVM and AVM2 for V_T , ΔP_{stat} and MP plotted against mean RC_e for both modes.