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Title: Arterial blood gas levels in asthma: A systematic literature review

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Body: Background Acute adult asthma is associated with hypoxemia, whereas reported CO2 levels range from hypo -to hypercapnia. A systematic literature review was performed in order to compile the current knowledge of arterial tensions of oxygen (PaO2) and CO2 (PaCO2) at different degrees of asthma severity. Methods A systematic literature search in PubMed, Scopus and Web of Science yielded 21 articles from 1967 to 2008 that reported adult asthma values of PaO2 and PaCO2 together with FEV1, % of predicted (FEV1%). Weighted regression models were fitted for PaO2 and PaCO2 as functions of FEV1%. For six asthma provocation studies, pre – and post-provocation values of PaO2 and PaCO2 were compared. Results PaO2 showed a linear correlation with FEV1% ($R^2 = 0.72$, $p < 0.001$), PaO2 falling by a mean of 0.5 kPa for every 10% reduction in FEV1%. PaCO2 did not change significantly until FEV1% dropped below a value of approx. 25, at which point it showed a significant increase.

All provocation studies showed significant falls in PaO2 (mean fall 3.2 kPa, $p < 0.05$), while changes in PaCO2 were non-significant. Conclusions In adult asthma, PaO2 falls linearly with the reduction in FEV1%, though there is no significant change in PaCO2 until FEV1% falls below approx. 25, thus indicating that hypocapnic hyperventilation is uncommon in acute asthma. This stability of PaCO2 indicates that PaCO2 may still be the main determinant of minute ventilation in mild to moderate attacks.