

# Repeatability of respiratory data in the individual subject

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A knowledge of the repeatability of any respiratory measurement in the individual is a prerequisite when assessing the significance of the change in state produced by any experimental procedure. Such information is available in the literature only in scattered and incomplete detail.

The accompanying Table presents such data, and, as the high degree of repeatability in the individual is often not appreciated, a record of the published variation for normal groups is included for comparison.

All measurements are based on duplicate sampling compared with duplicate sampling 10 minutes later. Details of the methods are available together with a complete statistical analysis in the author's M.D. thesis (1962) of the University of Birmingham. The patients were undergoing thoracic, abdominal, and other major surgical procedures. Measurements were made pre-operatively and 24 hours post-operatively, and there was no difference between the statistical analysis

of differences pre-operatively and post-operatively.

It is hoped that the publication of these data will help investigators to define a steady state in their patients.

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TABLE

Measurement	No. of Paired Comparisons	S.D. of Difference	95% Confidence Limit of Difference	Published S.D. within a Group of Normals	Reference
Vital capacity (l.)	56	0.16	0.26	0.48	Greifenstein <i>et al.</i> (1952)
One-second forced expiratory volume (l./sec.)	56	0.11	0.25	0.67	Kory <i>et al.</i> (1961)
Maximal mid-expiratory flow rate (l./sec.)	56	0.50	1.03	1.30	Kory <i>et al.</i> (1961)
Respiratory frequency (breaths/min.)	41	1.40	2.83	4.80	Greifenstein <i>et al.</i> (1952)
Minute ventilation (l./min.)	41	0.51	1.03	1.70	Greifenstein <i>et al.</i> (1952)
Tidal volume (ml.)	41	28.00	57.00	116.00	Shock and Yiengst (1955)
Oxygen consumption (ml./min.)	20	5.60	11.80	17.00	<i>Handbook of Respiration</i> (1958)
Carbon dioxide output (ml./min.)	20	6.40	13.50	11.07	<i>Handbook of Respiration</i> (1958)
Respiratory exchange ratio	20	0.04	0.084	0.140	Raine and Bishop (1963)
Bohr deadspace (ml.) <sup>1</sup>	20	12.60	26.60	51.50	Raine and Bishop (1963)
Deadspace tidal volume ratio (%)	20	2.00	4.20	6.20	Raine and Bishop (1963)
Alveolar oxygen tension (mm. Hg) <sup>2</sup>	20	2.30	4.80	9.90	Raine and Bishop (1963)
Arterial oxygen tension (mm. Hg) <sup>2</sup>	41	2.60	5.30	5.50	Bartels and Rodewald (1952)
Arterial carbon dioxide tension (mm. Hg) <sup>3</sup>	41	1.70	3.40	1.90	<i>Handbook of Respiration</i> (1958)
Alveolo-arterial oxygen tension difference (mm. Hg)	20	2.60	5.50	7.40	Raine and Bishop (1963)
Estimated venous admixture (%)	20	2.40	5.00	—	—
Arterial carbon dioxide content (mm./l.)	35	0.17	0.35	2.10	Greifenstein <i>et al.</i> (1952)
Arterial blood pH	32	0.017	0.04	0.03	Greifenstein <i>et al.</i> (1952)

Notes: <sup>1</sup> Assuming PACO<sub>2</sub> = P<sub>a</sub>CO<sub>2</sub>.

<sup>2</sup> Calculated from alveolar air equation.

<sup>3</sup> Microtonometry (Riley, Campbell, and Shepard, 1957).

<sup>4</sup> Charts of Riley, Cournand, and Donald (1951).