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Correspondence

Validity of Written Examinations

To the Editor:—We recently reviewed the score results for the American College of Anesthesiologists' Annual Certification Written Examination and were fascinated to find that candidates with less training and experience appeared to perform better than those with more training. In a representative sample from the provided norm (table 1), the standard score an individual received was compared with a percentile rank (the percentage of candidates taking the exam that scored less well than the individual under consideration). This comparison was made for the total group of candidates taking the exam and also for subgroups of the candidates divided according to similar degrees of training.

In the total group, which includes U.S.–Canadian as well as foreign medical graduates, for any selected standard score, those individuals with two or more years of residency generally had higher percentile ranks than those individuals with less training (less than two years of residency). This indicates that the more highly-trained resident group, as a whole, performed less well, allowing an individual in this group to have a higher percentile rank than were he in the resident group with less training for any given standard score. Similarly, the percentile ranks for those candidates who presumably had had even more training and had completed their residencies were consistently higher than those of the other two groups with less training for any given standard score, thus indicating the poorest performance of all by individuals in this group.

From these results, one or more of the following conclusions might be drawn:

1. The more training one receives, the less one in fact knows.

2. The mental deterioration that occurs due to aging as one progresses through a two-or-three-year training program affects one's ability to perceive and respond appropriately under examination.

3. Enthusiasm for study decreases as one advances in training and experience, thus making one less able to answer college-type questions correctly (what implications does this have for anesthesiologists as they leave residency and enter practice?).

4. Breathing trace anesthetic agents for longer periods of time results in a decrement in test performance.[1]

TABLE 1. Percentile Ranks

Standard Score	Total Group (n = 510)	Less than 2 Years of Residency (n = 263)	2 Years of Residency or more (n = 98)	Completed Residency (n = 149)
600–609	94	92	95	99
500–509	76	70	72	90
400–409	54	43	46	80
300–309	29	20	21	49
200–209	13	8	6	28
100–109	4	1	2	10

We feel, however, that another conclusion seems the most reasonable. We believe that the above-noted relationship exists because written examinations primarily test recall of facts rather than testing medical judgment. We conclude that the degradation in test results among individuals with more training and experience reflects the decrease in knowledge of specific facts that may occur during the time medical judgment is developing. If true, this conclusion has profound implications concerning the reliability of written examinations to assess adequately an individual's overall clinical competence, especially during the relicensure and recertification processes.

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Face Tent *vs.* Face Mask for Oxygen Therapy

To the Editor:—In 1976, Gibson *et al.*[1] studied intratracheal oxygen concentrations achieved with various types of equipment used to deliver supplemental oxygen to spontaneously breathing patients. Their experimental model involved percutaneous placement (via cricothyroid puncture) of a small sensing catheter into the tracheas of trained subjects, who then were fitted with various oxygen delivery devices

such as nasal prongs, face masks (Hudson Soft Elongated Aerosol Mask) and face tents (Hudson Face Tent No. 1095; Hudson Company, Wadsworth, Ohio). The subjects maintained a defined breathing pattern with specified tidal volume, peak inspiratory flow rate, and minute ventilation. The sensing catheter led to a continuously-sensing medical mass spectrometer. A surprising finding of their study was that the face tent appeared to provide more oxygen (88 per cent) than the face mask (54 per cent) when both were supplied with 15 l/min of pure oxygen from an Ohio Deluxe nebulizer during normal breathing.

The interest in wider use of the face tent generated by this report prompted us to attempt to duplicate and expand upon these data. We have used essentially the same experimental model as Gibson *et al.*, except that we placed the sensing catheter into the trachea transnasally, employing direct laryngoscopy under topical anesthesia. An MMS-8 (Scientific Research Instruments, Inc., Baltimore) mass spectrometer sampled from the catheter continuously at 1 ml/sec; output signals (P_{CO_2} and P_{O_2}) were recorded on a Grass polygraph (Grass Instrument Co., Quincy, Mass.). The trained subject maintained a fixed breathing pattern at a tidal volume of 500 ml and a frequency of 12/min. The stability of this pattern was assured by intermittent spirometry and by observation of a constant end-expiratory P_{CO_2}. The subject was fitted alternately with face mask and face tent supplied with various oxygen concentrations from a calibrated Ohio Deluxe nebulizer primed with 15 l/min oxygen (table 1).

The face mask in every case supplied a higher peak tracheal oxygen concentration than the face tent. Similar results were obtained with the subject sitting erect and with the head elevated 45 degrees. Grouped data (nine comparisons) were analyzed using a nonparametric sign test. Concentrations achieved with the face tent were significantly lower than those achieved with the face mask ($P < 0.01$).

The face tent has been shown to have greater deadspace than the plastic face mask.[2] The amount of rebreathing that occurs increases sharply when the oxygen flow fails or is decreased. Healthy persons can increase minute ventilation to maintain normal alveolar P_{CO_2} in this situation; however, debilitated patients may not be able to compensate in this manner.

TABLE 1. Peak Tracheal Oxygen Concentrations Achieved in Supine Subject Breathing Oxygen Supplied by Face Mask or Face Tent

$F_{I_{O_2}}$	Tracheal Oxygen Concentration (Per Cent)	
	Face Mask	Face Tent
0.4	39	29
0.6	41	33
1.0	54	46

Data from studies such as this cannot predict the $F_{I_{O_2}}$ that will be presented to, or the arterial oxygen tension which will be produced in, a given patient. We believe these data suggest two reasons the face mask may be a more prudent choice than the face tent in certain clinical situations. First, the inspired oxygen concentration more closely approximates that nominally delivered by the device; second, the mask causes less rebreathing should it become disconnected from the oxygen supply.

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Assessment of Coma and Severity of Brain Damage

To the Editor:—Having devised a scale for assessing impaired consciousness in patients with brain damage,[1] we are pleased to find Dr. Marsh and his colleagues[2] and others[3,4] advocating its use. However, Marsh *et al.* critize the Glasgow Scale as being an incomplete measure of responsiveness of vital functions. We have previously emphasized that this scale forms only part of the assessment of brain-damaged patients, whether monitoring coma at the bedside,[5] or describing severity of injury in a series of patients, as in our international collaborative study.[6] The relationships between the coma scale responses and other aspects of coma (pupil reactions, eye movements and autonomic abnormalities) have been analyzed in detail by us in a series of 700 patients.[7] The alacrity with which the scale has been adopted in many centers