Selection of an inhalational anesthetic is often based upon anecdotal reports suggesting that certain drugs are "less pungent," "smoother" and better tolerated during certain inhalant techniques. The authors tested the hypothesis that there would not be demonstrable preference for the inhalant halothane over the modern ether-based agents. Results suggest that (1) agent selection should be based upon physiopharmacological criteria rather than alleged patient acceptance, and (2) technique and experience in use are the primary factors predicting efficaciousness.

When gaseous anesthetics are employed for anesthetic induction and maintenance, it is important that they be non-irritating and rapidly produce desired alveolar concentrations. Reports of the incidence of undesirable reflex activity, such as coughing, breath-holding and laryngospasm, are highly variable. Generally halothane (H) is preferentially employed over enflurane (E) or isoflurane (I) for inhalation induction as it is considered to be the least irritating and pungent and best received by patients.\(^1,2\) This practice appears to be primarily anecdotal in nature. Controlled studies of olfaction and patient acceptance are lacking.

Selection of an inhalant for clinical use is a multidimensional process with factors such as experience and technique being largely responsible for the reported differences among the agents utilized. It has been shown that induction/emergence times are either similar or better with the modern ethers when H, E and I have been compared.\(^3-5\) Both E and I have been shown usable with pediatric mask inductions, extending the pharmacologic advantages of these agents to all patients.\(^6,7\) These studies are tempered by reports that the reflex response to the pungency of I represents a major drawback to the induction and maintenance of anesthesia with this drug.\(^1,2,8-11\)

The authors' experience with I as an induction agent in adults and children has been favorable and differs markedly from the unsatisfactory reports of other investigators. I is preferentially employed by the authors over other inhalants because of its significant physical-chemical, pharmacological and physiological advantages.\(^12-15\) The authors tested the hypothesis that there are no significant differences in the perceived pungencies of the inhalation anesthetics H, E or I in a healthy young adult population.

**Methodology**

Three hundred individuals aged 17 to 41, in excellent health and free from deficits of olfaction, participated in the investigation. There were 178 males and 122 females. Participants were selected at random from a non-medical population at large. Each individual received a brief explanation as to the purpose and procedure of the study.

A double-blind methodology was employed to
test the hypothesis. A large cotton ball saturated with approximately 10 ml of each inhalational agent (H, E or I) was placed in a 30 ml amber glass flask. Flasks were numerically coded and were replaced with new flasks after every tenth subject to ensure freshness. One of five trained observers administered the test to each subject, who was asked to briefly sniff the contents of each of three flasks that were randomly selected, with a 60-second “rest” period between flasks. Following each sniff the participant was asked Question A: “Do you like, have no opinion, or dislike the smell?” The response was noted for each separate reply. When the response had been tabulated for each flask the participant was asked Question B: “If you were to have an anesthetic, which of the smells would you prefer (flask X, Y or Z, or no preference)?” This response was also recorded.

Statistical analysis was accomplished with chi square analysis of the tabulated results to determine if significance existed between groups (p<0.05). At this point the drug code was broken to facilitate data interpretation.

Results
No subject reported or demonstrated an untoward response to the study (such as, dizziness, nausea, headache or the like). Table I notes the response to the first question addressing the subjective pungency of each agent. There were no significant differences in response pattern that could be attributed to the individual agents. The majority of participants expressed global “dislike” for the inhalants.

Table II reports the response to the question examining individual preferences for each agent. Again there were no significant differences demonstrated that could be attributed to the agents themselves. Individuals were as likely to select one agent as they were another. The overwhelming majority (57.3%) expressed “no preference.”

Of the individuals who expressed “no preference” (n=172) in response to Question B, 154 (89.53%) had expressed either “no opinion” or “dislike” in response to Question A, and 18 (10.47%) had responded exclusively with “dislike.”

Discussion
The authors have gained considerable experience with the utilization of mask I anesthesia for inhalation induction and maintenance in both children and adults who often arrive in the operating room unpremedicated. The authors’ experience with I has not been conspicuously different from that with H and E. The problems described by other authors2-8-11 are uncommon with the authors’ technique, which consists of 30-60 seconds of antecedent 70% nitrous oxide (high flow in oxygen) followed by 0.25% I with progressing increments of the potent agent every fourth breath, with or without the use of small doses of barbiturate. Reports of problems have appeared primarily anecdotal in nature and inspired the authors to engage in the current investigation.

There was no significant difference in the

<table>
<thead>
<tr>
<th>Table I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Response to question A: “Do you like, have no opinion, or dislike the smell of bottle X, Y, and Z?”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Agent</th>
<th>Like (%</th>
<th>No opinion (%)</th>
<th>Dislike (%)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halothane</td>
<td>53 (17.6%)</td>
<td>83 (27.6%)</td>
<td>164 (54.6%)</td>
<td>300 (100%)</td>
</tr>
<tr>
<td>Enflurane</td>
<td>61 (20.3%)</td>
<td>97 (32.3%)</td>
<td>142 (47.3%)</td>
<td>300 (100%)</td>
</tr>
<tr>
<td>Isoflurane</td>
<td>49 (16.3%)</td>
<td>99 (33.0%)</td>
<td>152 (50.6%)</td>
<td>300 (100%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table II</th>
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<tr>
<td>Response to question B: “If you were to have an anesthetic, which of the smells would you prefer (Flask X, Y, Z or no preference)?”</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Agent</th>
<th>Number (%) expressing preference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halothane</td>
<td>49 (16.3%)</td>
</tr>
<tr>
<td>Enflurane</td>
<td>34 (11.3%)</td>
</tr>
<tr>
<td>Isoflurane</td>
<td>45 (15.0%)</td>
</tr>
<tr>
<td>No Preference</td>
<td>172 (57.3%)</td>
</tr>
</tbody>
</table>

Journal of the American Association of Nurse Anesthetists
manner in which healthy young adults perceived the effluent of an ether versus a hydrocarbon inhalant in this investigation. While certain individuals expressed an olfactory preference for particular agents (see Table II), the overwhelming majority had no preference and variances in perceptions were irregular, unpredictable and insignificant. Certainly, it may be psychologically beneficial to employ the preferred agent if the opportunity is offered the patient, and pharmacological and physiological factors permit its administration. The authors view the selection of an inhalation agent much like the selection of other intraoperative pharmacologicals. The decision should be a multidimensional process based upon the unique needs of the patient and attention to such factors as agent physiochemistry and the cardiovascular and metabolic ramifications of the drug. The authors find reports and evaluations of “pungency,” “increased reflex activity,” and difficulty in employing I in mask anesthesia to be often anecdotal in nature, poorly designed or lacking in appreciation for the unique physiochemistry of this E isomer.

Many of the so-called “reflex” manifestations attributed to I “pungency,” such as apnea, breathing and the like, may simply represent compression of the anesthesia time frame from induction to development of anesthesia.36 Patience and appreciation for this phenomenon of rapid entry into and through Guedelian Stage II excitement, in conjunction with management by gradual, progressive increases in delivered concentration with gentle positive pressure assistance, facilitates induction. Converseance with the unique physiochemistry and pharmacological properties of a particular inhalant will facilitate its smooth, clinically efficacious utilization.

This current investigation must be kept within proper perspective. Extrapolation to a sick adult population or to a pediatric population may be inappropriate. However, the investigation has demonstrated that healthy young adults manifest no predictable olfactory preference or repulsion for any of the inhalational anesthetics in common use today, and their perceptions of the vapor of the agents does not vary in any meaningful way. An appreciation for the unique physiochemistry of I and modification of technique of its use to accommodate these properties will enhance its use in the hands of the anesthetist.

REFERENCES

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