Anaesth Intens Care 1996; **24:** 483-485

Special Communication

The Taste of Intravenous Thiopentone

N. B. M. NOR*, M. A. FOX†, I. R. METCALFE‡, W. J. RUSSELL§

Royal Adelaide Hospital, Adelaide, South Australia

SUMMARY

Patients sometimes notice an onion or garlic taste before losing consciousness with thiopentone. An assessment of 113 patients revealed that 42% of patients noticed this taste. The effect was observed less in older patients. There was no statistically significant difference in the incidence between men and women. Premedicated patients had a lower incidence, but this was explained by the greater proportion of older patients receiving a premedication. If the taste effect of thiopentone is genetically determined then it is a different gene to thiocarbamate which has about 75% tasters.

Key Words: ANAESTHETICS, INTRAVENOUS: thiopentone

Patients induced with thiopentone not uncommonly comment upon a taste of garlic or onions. In searching the literature, we could find no researched information about the cause or the frequency of this phenomenon. However, this taste is not experienced by all patients. The aim of this survey was to ascertain the incidence and pattern of the taste of thiopentone and examine the factors that might modify it.

METHODS

Patients about to receive thiopentone induction were informed they might taste onions or garlic. Thiopentone 2.5% was administered at an initial dose of 1 mg per kg body weight to provide mild sedation. After this, the patients were asked if there was any taste in their mouth. A verbal "yes" or a nod was taken as indicative of positive taste. A "no" or shake of the head was taken as a negative test. If they said "yes" they were also asked if they had an onion or a garlic taste. Subjects who did not answer either positively or negatively were not included in the analysis. Subsequently the induction of anaesthesia was completed with the appropriate dose until loss of consciousness occurred.

*M.D., (U.K.M.), Registrar.
†F.A.N.Z.C.A., Staff Specialist.
‡F.A.N.Z.C.A., Staff Specialist.
§F.A.N.Z.C.A., F.R.C.A., Ph.D., D.I.C., Director, Research and Development.

Address for Reprints: Dr W. J. Russell, Department of Anaesthesia and Intensive Care, Royal Adelaide Hospital, North Terrace, Adelaide, S.A. 5000.

Accepted for publication on August 25, 1995.

Statistical analysis was by Fisher's Exact test and Chi square analysis. Significance was set at the $P=0.05$.

This study had the approval of the Ethics Committee of the Royal Adelaide Hospital.

RESULTS

One hundred and sixteen patients were assessed. Two subjects failed to answer and one said "oil". These three were excluded from analysis. The patients' ages ranged from 6 to 85 years. A positive response of tasting onions (10) or garlic (39) was elicited from 49 patients while 64 patients perceived neither taste, an overall positive response rate of 43%.

Gender

There were 63 male patients in the study and 31 gave a positive response, an incidence of 49%. There were 50 females in the study and 18 were positive for taste, an incidence of 36%. This result does not suggest any gender bias in whether the subject notices the taste ($P=0.18$ Fisher, two-side). The mean age of each gender was similar, 35.0 (SD 24.7) years for females and 34.0 (SD 21.5) for males.

Age

The patients were categorized into three age groups, ages <17 years, 17 to 59 years and = >60 years. There were 39, 53 and 21 patients in each group and the percentage of tasters was 51%, 45% and 24% respectively. This reduction in the propor-

tion of tasters as age increased was statistically significant (P=0.027 one side). If the 60+ age group is compared with the rest, there is a statistically significant reduction in tasters (24% v 48%, P=0.037 Fisher one-side).

Premedication

Forty-two patients were premedicated, either an intramuscular opioid and an anti-emetic combination (24 patients) or an oral benzodiazepine (18 patients). The proportion of patients who noticed the taste after premedication was less, and the difference was statistically significant (P=0.050 Fisher two-side). The type of premedication made no difference to this reduction (P=0.75 Fisher). However, 60% of patients 60 years or over had premedication, whereas only 18% of patients under 60 years had premedication, so that the age interaction could be the explanation. Indeed when the patients under 60 years alone were examined, there did not appear to be a significant association with premedication and the perception of taste (P=0.12 Fisher two-side).

DISCUSSION

There are four basic sensations of taste: sweet, sour, salt, bitter. The most sensitive is the bitter taste; far fewer molecules give a bitter taste than those for a sweet, salt or sour substance[1].

The sense of taste deteriorates with age. Ship and Weiffenbach noted older people had a lesser smell and taste identification[2]. This was supported by Frank, Hettinger and Mott who observed that the sense of taste, particularly bitter taste, was impaired with increasing age[3].

Our survey showed a difference in the incidence of taste of onion or garlic during thiopentone induction in the different age groups. The sensation of taste in our study came from an intravenously administered substance and thus taste buds were not stimulated in the normal way. Indeed it is an assumption that the thiopentone "taste" sensation was due to stimulation in the tongue. However the subjects noticed the taste before becoming obviously obtunded. This timing would support the hypothesis that stimulation in the tongue is the source of the taste sensation. The reduction in frequency of the thiopentone "taste" with age is also consistent with the hypothesis that the onion or garlic "taste" is a stimulation of the taste receptors.

The apparent reduction of the frequency of the response with premedication is probably due to the greater proportion of older patients receiving premedications rather than the suppression of a central component to the perception.

The taste of thiopentone has been associated with the structure of allicin. Allicin is a low molecular weight organic substance in garlic and onion, that not only gives them their strong, sharp odour but also their taste[5]. Although chemical similarities have been claimed for allicin and thiopentone[6], these are not obvious (Figure 1). Even the three-dimensional structures are unlike. Thiopentone has a structure which is only vaguely similar to the structure of allicin and structurally has more in common with thiocarbamate. Thus the reason for thiopentone having this taste effect of onions or garlic on about 40% of the population remains unclear. It may be that the receptor has more than one susceptible surface and allicin and thiopentone key in different ways to achieve a similar sensation. However, thiopentone would seem to more resemble thiocarbamate than allicin, and the fact that it and thiopentone have markedly different tastes suggests that any keying to a receptor surface has a geometry which does not follow the thiourea molecular structure.

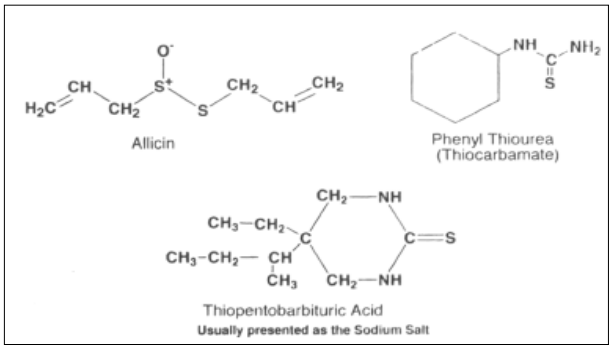

FIGURE 1: Diagram of the molecular structures of thiopentone, allicin, and thiocarbamate. Both thiocarbamate and thiopentone have the sulphur atom within a thiourea structure. No comparable structure exists within the allicin molecule.

The frequency of the taste effect also is different from that of thiocarbamate. The quoted incidence for thiocarbamate is about 75% positive and 25% taste blindness. This phenomenon of "taste blindness" is transmitted in an autosomal recessive manner[4]. The thiopentone taste may also be an autosomal trait; our survey supports this by the lack of significant male-female difference in the incidence of taste. However, if it is genetic, it would appear not to be the same gene as the difference in frequency of the thiocarbamate (75% positive) compared with thiopentone (42% positive) is unlikely to have occurred by chance (95% confidence interval for thiopentone is 33-52%).

REFERENCES

1. Guyton AC. Textbook of Medical Physiology. 8th Ed. Chapter 53, The chemical senses—Taste and Smell. Philadelphia, WB Saunders 1991; pp 581-587.
2. Ship JA, Weiffenbach JM. Age, gender, medical treatment and medication effects on smell identification. J Gerontology: Medical Sciences 1993; 48:M26-M32.
3. Frank ME, Hettinger TP, Mott AE. The sense of taste: neurobiology, aging and medication effects. Critical Review Oral Biol Med 1992; 3:371-393.
4. Race RR, Sanger R. Blood Groups in Man. 3rd Ed. The tasting of phenyl thiocarbamide. 1958; p 338.
5. Block E. The chemistry of garlic and onions. Scientific American 1985; 252(3):94-99.
6. Body SC. A taste of allicin? Anaesth Intens Care 1986; 14:94.