

Information obtained from *Playfair*<sup>2</sup> allowed the batting performances of affected players to be compared with those of the entire cricketer cohort (306 players). The average batting performance for all cricketers was 25.631 (SD=14.35) for the season. The batting average for the colour blind group was slightly below this at 25.51 (11.43). This difference was not statistically significant.

The mean batting averages of the colour blind players over the two seasons since the introduction of the white ball into Sunday League cricket (21.64, SD=14.8) and the previous two seasons (18.94, SD=11.82) seems to show a slight improvement in the batting figures, but this difference is not statistically significant. It is not appropriate to compare differences in batting averages between the one day and the four day games.

### Discussion

Our figures show that the incidence of red-green colour blindness in professional cricketers is approxi-

mately half of that in the normal male population. There seems to be no difference between the numbers of batsmen and bowlers affected. Batting performance is not significantly impaired, suggesting that to some extent these players are self selected and cope with their colour blindness. Indeed, one former international opening batsman is sufficiently colour blind so as to have extreme difficulty distinguishing the colour of snooker balls (G G Arnold, personal communication).

We do not recommend routinely assessing players for colour blindness. The white ball in the one day game seems to make little difference to batting performance.

We thank all the county coaches, captains, and players who cooperated so kindly and patiently during the course of our research, and Mr Richard Lockwood for providing the statistics for the AXA Equity and Law Sunday League.

1 Trevor-Roper PD. *Lecture notes in ophthalmology*. London: Blackwell Scientific, 1976.

2 Frindall B. *Playfair Cricket Annual 1994*. London: Headline, 1994.

## How sensitive are cardiac surgeons' fingers?

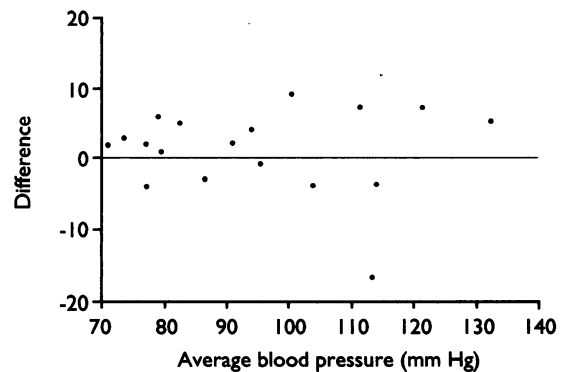
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During open heart surgery for many years surgeons have used estimates of arterial and pulmonary artery pressure from direct digital palpation despite the array of monitoring equipment that is in evidence at the time of the operation. The reasons for this range from disbelief in the accuracy of often ancient monitoring equipment to the not uncommonly seen difference between central aortic pressure and peripheral radial artery pressure after cardiopulmonary bypass.<sup>1,2</sup> Claims by cardiac surgeons that their digital estimates of pressure may be accurate are often greeted with derision by their anaesthetic and junior surgical colleagues. The purpose of this study was to investigate the accuracy of blood pressure estimation by digital palpation of major vessels during heart surgery by different grades of surgical staff.

### Methods and results

Subjects were the cardiac surgical staff of one consultant firm. The study was carried out during 18 consecutive open heart operations. After cardiopulmonary bypass was discontinued the monitoring equipment was arranged so that none of the operating surgeons could see it. A needle on the transducer was used to measure direct systolic pressure in the ascending aorta and the main pulmonary artery. The exact technique of digital palpation varied slightly between subjects but usually consisted of gentle palpation of the blood vessel with the pulp of the index finger of the right hand. At the time of the estimate the directly measured aortic pressure was recorded, as was the radial artery pressure. The order in which the staff made their estimates was varied to reduce the influence of copying. This was repeated for each grade of surgical staff. The same procedure was used for the pulmonary artery pressure. Estimates by each grade of surgical staff were plotted against directly measured aortic pressures (the "standard"), and best fit lines were drawn. Agreements between surgeons' estimates, direct measurements, and radial artery pressure monitor measurements were compared by the method of Bland and Altman.<sup>3</sup>

The figure compares consultants' estimates of systolic blood pressure and directly measured aortic pressure. Mean differences between the estimated and measured systolic aortic pressure were 1.1 (95% confidence interval -1.9 to 4.1) mm Hg for consultants, 2.2 (-1.8 to 6.4) mm Hg for registrars, and 0.4 (-5.5 to 6.4) for senior house officers. Estimates by consultant, registrar, and senior house officer were all highly correlated with central aortic pressure.



Difference between consultants' estimates of systolic aortic blood pressure and direct measurements, plotted against the average of these values

Differences between digital estimates and radial artery measurements (mean -4.2 (-8.7 to 0.3)) were modest, bearing in mind accuracy, reproducibility, and digital preference in blood pressure measurement,<sup>4</sup> and also when compared with the differences found between radial artery measurements and the standard. Estimates of pulmonary artery pressure showed a less impressive correlation with direct measurements, and surgeons' estimates tended to be lower than the pulmonary artery catheter measurements (mean difference -2.8 (-6.2 to 0.6) for consultant). The underestimate was modest, however, and 95% confidence intervals were within 10 mm Hg for all grades of surgical staff.

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## Comment

The hypothesis that experienced cardiac surgical staff can accurately estimate systolic arterial blood pressure by digital palpation seems to be upheld in this study, although estimates of pulmonary artery pressure were less accurate. One potential criticism of the study is that junior staff may not perform at their best because of a concern not to embarrass their senior colleagues by outperforming them. In addition, it was not possible to totally eliminate the influence of observers copying each other's estimates, though the order in which estimates were made was varied to minimise this influence.

Visual assessment and digital palpation are often used by cardiac surgeons when extracorporeal circulation has been discontinued to assess systolic blood pressure and decide whether blood transfusion or inotropic support is needed. This is done out of habit and, not uncommonly, because the radial arterial catheter has accidentally been dislodged or obstructed.

By repeated palpation of major vessels and instant correlation with the monitoring display, surgeons may be able to train themselves. The skill of digital palpation may therefore become an integral part of surgical training.

It is, however, conceivable that cardiac surgeons may have genetically abnormally sensitive fingertips, perhaps related to an increased density of Meissner's corpuscles in the dermis. Current and future research is directed towards histological evaluation of the tips of cardiac surgeons' index fingers to assess the density of pressure receptors, although progress has been slow as experimental tissue has proved hard to obtain.

- 1 Pauca AL, Hudspeth AS, Wallenhaupt SL, Tucker WY, Kon ND, Mills SA. Radial artery-to-aorta pressure difference after discontinuation of cardiopulmonary bypass. *Anaesthesiology* 1989;90:935-41.
- 2 Urzua J. Aortic to radial arterial pressure gradient after bypass. *Anaesthesiology* 1990;73:191.
- 3 Bland M, Altman DG. Statistical method for assessing agreement between two methods of clinical measurement. *Lancet* 1986;ii:307-10.
- 4 Lowe CR, McKeown T. Arterial blood pressure in our industrial population. *Lancet* 1962;ii:1086-92.

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## Ability to distinguish whisky (uisge beatha) from brandy (cognac)

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### Abstract

**Objective**—To assess ability to distinguish between first rate malt whisky and brandy and between different brands of each.

**Design**—Crossover with two sessions of 12 blind-fold tastings of two whiskies and two brandies before and after supper, repeated not more than seven days later.

**Setting**—Dundas, Ontario.

**Participants**—4 volunteers aged 50-68 years, all moderate drinkers of alcohol and members of a wine club.

**Main outcome measures**—Proportion of samples correctly identified (whisky v brandy) and, of those, the proportion of brands correctly identified.

**Results**—Only one participant produced irrefutable statistical evidence ( $P < 0.0001$ ) of being able to distinguish between whisky and brandy, correctly identifying 50/51 (98%) samples. Two participants achieved some success in identification (72%,  $P = 0.0031$  and 65%  $P = 0.031$ ). The fourth participant's responses reflected pure guesswork. Brandy was no easier to identify than whisky ( $P = 0.84$ ). The participant who was best able to distinguish between whisky and brandy was also best able to identify correctly the brand of whisky (100%,  $P < 0.0001$ ).

**Conclusion**—Despite the fact that not all participants completed the full number of tastings the results show that some participants could distinguish neither between malt whisky and brandy nor between different brands of whisky and brandy. However, the success of one participant shows that "it can be done" and that his whisky specific ability is acquired not innate.

### Introduction

In their classic study reported in the 1983 Christmas issue of the *BMJ* Chadwick and Dudley found that English surgeons cannot distinguish between single malt and blend whiskies.<sup>1</sup> We have addressed the more fundamental question: Can anyone identify whisky at all? We took advantage of a cunning experimental

design to ask also the subtle question: Can anyone distinguish between first rate whiskies and brandies?

### Materials and methods

The four subjects were all volunteers, who gave oral consent to participate in the study provided that transport was provided. They were all mildly anglophobic and francophobic, being a Scot (participant 1), a Scots-Irish (participant 2), a New Zealander (participant 3) and a Canadian (participant 4). None was a surgeon. All were regular, if moderate, consumers of liquor and were members of a wine club, well versed in blind tasting. Critics may contend that exclusion of English and French (including Québécois) volunteers biased the results. Anglophiles and francophiles, however, are a small minority; the large majority of drinkers are anglophobes and francophobes.

The drinks selected for testing were the brandies Courvoisier and Rémy Martin and the whiskies Glenfiddich and Springbank. The brandies are probably the most widely available; the malt whiskies were chosen to balance the west of Scotland against the Highlands, but they are, or course, both *tobraichean na beatha*.<sup>2</sup> We should perhaps have chosen whisky from Islay, but this aberration probably did not affect the results.

The studies were conducted in the evening. The subjects were blindfolded. Each liquor was dispensed in a dose of 1 fl oz (8 drams, 28 ml) in a cut glass tumbler that would hold 6 fl oz (48 drams, 170 ml). The whole dose was rarely consumed. No water or other contaminant was permitted. To lessen the ethanol load each participant was studied in two sessions not more than seven days apart. At half time in each session, the participant consumed a light supper of soup, bread, and cheese washed down with a glass of Bulgarian Merlot.

### DESIGN

We had intended to follow a multiple crossover format fully balanced by order with repeat observation before and after supper. The four varieties of liquor (two brandies, two malt whiskies) could have been

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