skills are maximised through experience and that cost efficiency is increased. The cost of identifying each true case of retinopathy needing treatment has been shown to fall as throughput increases.³ Patients are recalled to the screening clinics through use of a computerised appointment system and a centralised register. Diabetes care requires several health care processes, as well as screening of the eyes, to be performed regularly in a large number of people. The Clinical Standards Advisory Group has recommended that, for this to be organised efficiently and completely, health districts should develop and maintain registers of all people with diabetes in the locality to span the boundaries of the provision of primary and secondary care.⁴

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Annual retinal photography is not an option in India

EDITOR,—Bob Ryder advocates the use of ophthalmoscopy combined with retinal photography after dilatation of the pupil in screening for diabetic retinopathy.¹ Differences in cost between the methods depend on the high capital cost of the camera, the cost of transporting the patient to a centre where a fundus camera is available, compliance, and the time taken to examine the patient.

Although direct ophthalmoscopy is possible in an underdeveloped country such as India, examination of the fundus with the combined technique is not feasible because of financial constraints. Fundus cameras are available only at selected centres a rough estimate is that there is one fundus camera per 10 million population. Even some of the teaching departments of ophthalmology of medical colleges do not possess such a camera. Under these circumstances, if a fundus camera was used for screening the basic aim of providing a camera for angiography would be defeated as the workload would increase immensely, limiting the quality of treatment.

After pharmacological dilatation of the pupils of 214 of our diabetic patients an endocrinologist and ophthalmologist concurrently looked for retinal changes on direct ophthalmoscopy; there was disagreement in only three patients (unpublished observations). Foulds *et al* stated that ophthalmoscopic screening by either an ophthalmologist or a diabetologist was cost effective.² It has also been recommended that all diabetic patients should be screened annually, either by ophthalmoscopy through pharmacologically dilated pupils or by retinal photography, so that those requiring treatment are detected.³ This annual examination is not possible even in developed countries⁴ so cannot be expected in an underdeveloped country.

In India the treating doctor should examine the fundus by direct ophthalmoscopy when diabetes is diagnosed. A complete check up should include an assessment of vision with a Snellen's chart and, after dilatation of the pupils, examination by direct ophthalmoscopy of the macula, disc, and remaining portion of the retina, in that order, to assess sight threatening changes. If evidence of vision <6/6 or even very early changes such as microaneurysms, dot haemorrhages, and hard exudates are found the patient should be referred to a centre

where a fundus camera and laser are available for further management. This will reduce the burden of managing diabetic retinopathy on the doctor and the treating ophthalmologist.

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Screening should be organised by GPs

EDITOR,—Bob Ryder's editorial on screening for diabetic retinopathy highlights some of the difficulties associated with mass screening.¹ Ryder suggests that ophthalmoscopy (we assume that he means examination with a direct handheld ophthalmoscope) through dilated pupils is inadequate and instead suggests the use of combined dilated retinal photography and ophthalmoscopy by experienced staff. In our opinion, retinal photography or ophthalmoscopy through dilated pupils by a trained person (as described by Jacob *et al*)² is adequate and cost effective.

A problem that is common to the screening efforts of ophthalmologists, optometrists, and diabetes physicians is that they do not have access to the total population of diabetic patients. Anecdotaly this has resulted in ophthalmologists seeing a number of diabetic patients who present with advanced retinopathy. This clinical experience has been reinforced by a recent study suggesting that about half of patients registered as blind because of diabetic retinopathy had never had a previous fundus examination.³

In contrast, general practitioners have the theoretical ability to identify every known diabetic patient. Therefore, screening that is coordinated (but not necessarily carried out) by general practitioners has several theoretical advantages over screening in a hospital or by an optometrist. Despite these advantages, models of screening based in general practice have not been formally evaluated. Evaluation of such models is needed to allow comparisons with other methods before any particular screening programme is adopted nationally. In the meantime, we suggest that dilated funduscopy by an experienced person, with open access for a second opinion by an ophthalmologist or a consultant diabetologist, is the preferred method.

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Editorial overstated likelihood of missed retinopathy

EDITOR,—Undoubtedly, diabetic retinopathy remains an important cause of preventable blindness, but Bob Ryder's statement that ophthalmoscopy alone will miss up to two thirds of sight threatening cases is misleading.¹ In support of this view Ryder quotes our study of 1983 among others, but he misquotes our results.²

In our study the sensitivity of detection of any form of retinopathy, including background retinopathy, was close to 100%, but the specificity for the identification of sight threatening retinopathy was lower, with a rate of false positive results of 24% and a rate of false negative results of 3-4%—that is, a quarter of patients diagnosed as having sight threatening retinopathy were found on further investigation not to have it. Despite this fairly high rate of false positive results we nevertheless showed that screening by ophthalmoscopy through dilated pupils by specially trained observers was cost effective.

Our failure to detect 3-4% of patients with sight threatening retinopathy is at variance with the results of other studies quoted by Ryder that suggest that up to two thirds of cases of sight threatening retinopathy may be missed by ophthalmoscopy alone. The difference probably lies in the training that we gave to all of those (ophthalmologists and general physicians) who were involved in our screening programme, and we believe that this may be the most important aspect of screening for diabetic retinopathy whether by ophthalmoscopy or retinal photography or a combination of both.

In a study in Singapore in which one of us (WSF) was involved retinal photography through dilated pupils detected not only a high proportion of cases of sight threatening retinopathy but also an appreciable number of patients with the optic disc changes of open angle glaucoma. Whoever is assessing such retinal photographs must be conversant with the appearance of other forms of potentially sight threatening disease in the eye in addition to that of sight threatening diabetic retinopathy.

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Approaching 90% sensitivity with new techniques

EDITOR,—Bob Ryder advocates screening for retinopathy by using two methods simultaneously.¹ This is because none of the techniques available are sufficiently sensitive to use alone. Use of two techniques (for example, ophthalmoscopy and fundus photography) has yet to be shown to improve the overall sensitivity of the screening service, though it seems to be reasonably specific. Use of only one technique would be easier to administer and more acceptable to patients and is thus likely to have a better uptake.

Ryder points out some of the difficulties associated with non-mydratic single field fundus photography and highlights the low sensitivity (67%) found by Buxton *et al* when they used this technique.² In their study, however, ophthalmoscopy was used as the reference standard; this technique has considerable limitations when compared with slit lamp biomicroscopy or fluorescein

angiography. The technique used by Buxton *et al* has other limitations that can be improved on. Use of mydriasis eliminates the problem of poor quality photographs in the second eye as a result of persistent pupillary constriction. Use of more than one photographic field increases the area of fundus visualised, especially at the peripheries, and the detail of film clarity can be improved by using 35 mm film. These measures are all thought to improve diagnostic accuracy.³

We used mydriatic three field fundus photography with 35 mm film in a screening programme and found that it had a sensitivity of 89% when compared with a reference standard of slit lamp biomicroscopy by a senior ophthalmologist; its sensitivity was significantly better than that of 65% achieved by a trained ophthalmologist using an ophthalmoscope.⁴ This figure approaches the target of 90% sensitivity for a useful screening service.

Many other screening mechanisms are under examination, notably those based on community optometrists. It is important that the effectiveness of each of these methods is assessed by comparison of the sensitivity and specificity with those obtained with a quality reference standard. In addition, each method must be shown to reach the target population. Mobile fundus photography can successfully reach the target population.⁵ Although mydriatic multiple field fundus photography has not yet been shown to be consistently sensitive, we believe that, with the improvements in technique being introduced in many centres, it should not yet be dismissed as an independent form of screening for diabetic retinopathy.

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Author's reply

EDITOR,—I would like to illustrate the problem with Wallace C Foulds and Angus C MacCuish's interpretation of their data by using the following analogy. Suppose the incidence of phenylketonuria is 1 in 10 000 births. If a screening programme picked up 40 cases out of the 100 in a population of one million this would be 0.004% of the population, whereas the actual number of cases would be 0.01% of the population. The difference between these figures is 0.006%. However, the screening programme failed to detect 60 of the 100 cases. One would therefore have to say that the screening programme failed to detect 60% of the cases of phenylketonuria, not 0.006%.

The same applies to Foulds and MacCuish's study. Their detailed assessment suggested that 11% of their population had sight threatening diabetic retinopathy. The rates of detection with only dilated direct ophthalmoscopy, however, were 8% for the diabetologist and 7% for the

Rates of failure to detect sight threatening diabetic retinopathy by direct ophthalmoscopy through pharmacologically dilated pupils by different professionals. Figures are percentages*

	General practitioners	Optometrists	Hospital physicians	Ophthalmologists
Buxton <i>et al</i> , 1991 ¹	45	52	33	—
Finlay <i>et al</i> , 1991 ²	48	—	—	—
Foulds <i>et al</i> , 1983 ³	—	—	27	36
Harding <i>et al</i> , 1995 ⁴	—	—	—	35

*Reference standard in study of Buxton *et al* was both ophthalmoscopy and photography and not ophthalmoscopy alone, as implied in letter from Graham Leese and colleagues.

ophthalmologist. Though the difference between 11% and 7-8% is 3-4%, as with the example of phenylketonuria one cannot say, as Foulds and MacCuish suggest, that dilated ophthalmoscopy missed only 3-4% of cases of sight threatening retinopathy. One has to say that dilated ophthalmoscopy missed between three and four of 11 cases—that is, between 27% and 36%. In fact, in their original report Foulds and MacCuish acknowledged the underdiagnosis by ophthalmoscopy, though they did not quantify it as I have done.

These figures can be put into context by comparing them with those from other studies (table). They underline my thesis that ophthalmoscopy on its own as a screening tool is intrinsically unreliable no matter who does it. I agree with Foulds and MacCuish that the staff involved in screening should be both trained and experienced. If, however, one takes ophthalmologists and diabetologists as having the greatest degree of skill and experience and if they, when using only dilated direct ophthalmoscopy, usually miss between a quarter and a third of cases, it does not matter how much training is given to general practitioners or optometrists: the data suggest that large numbers of cases of sight threatening retinopathy will always be missed if screeners are allowed only direct ophthalmoscopy.

A screening system that misses between a quarter and two thirds of cases of sight threatening retinopathy is surely no longer acceptable, and it is time that everyone involved in screening accepted that direct ophthalmoscopy on its own is insufficient as a screening tool. Lairson *et al* have shown that 45° retinal photography is more sensitive than a combination of direct and indirect ophthalmoscopy used by an ophthalmologist,⁵ and Taylor *et al* have shown that photography and ophthalmoscopy each miss cases of sight threatening retinopathy that the alternative technique detects.⁶ This suggests that combining photography and ophthalmoscopy is the way forward. Colleagues and I have found a sensitivity approaching 100% when photography and ophthalmoscopy are administered by experienced screeners backed up by senior diabetologists.⁷ Single 45° field photography through dilated pupils seems to be the absolute minimum when combined screening is not possible. The three field photography used by Graham Leese and colleagues is an interesting alternative approach.

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The new deal revisited

Obstetric trainees are against

EDITOR,—Last May the Royal College of Obstetricians and Gynaecologists' national trainees committee published a report of a survey of training carried out between October 1944 and January 1995.¹ Replies were received from 70% of trainees in the specialty, and the report can therefore be said to be representative of their views. Altogether 85% of trainees in our specialty and 80% of those currently working shifts find shift systems detrimental to training and continuity of care; this is similar to the views expressed by anaesthetists.²

The minister for health and the NHS Executive gave prompt and detailed responses to our survey, but the Junior Doctors Committee, which is supposed to represent us in these matters, did not consider our trainees' views important enough to give any response until it had been asked three times to do so. It then produced a weak comment, in line with the NHS Executive's view, that the reason that shifts are unpopular is that they are badly designed. Are we really to believe that 80% of the shift systems in our specialty and 62% of those in anaesthetics, to name but two specialties, are badly designed, or is the real truth that the Junior Doctors Committee is out of touch and not representative of the views of most trainees in hospital specialties?

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- 1 Royal College of Obstetricians and Gynaecologists. *Survey of training*. London: RCOG, 1995.
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Survey showed most anaesthetists have no experience of shifts

EDITOR,—Peter Mackenzie reports a survey of anaesthetists in training that asked about the new deal.¹ This survey does no more than show junior doctors' apathy and misconceptions about the new deal in general and shift systems in particular. Less than a tenth of the respondents were working partial shifts, full shifts, or hybrid rotas, and only a quarter had had experience of them. This calls into question the validity of the opinions that are cited in the table reporting the effects of shift systems on aspects of trainees' lives. These opinions, from the majority of respondents, must at best, therefore, be based on hearsay or secondhand experience.

Perhaps the most concerning aspect of the survey is that 40% of respondents were working