

## Close up and personal

A device used in metallurgy should simplify the diagnosis of mouth cancer

THE first signs of cancer are often abnormal cell nuclei. These can be detected easily with a microscope, but getting them under that microscope is a palaver, since they have to be removed in a biopsy, then sent to the laboratory where the microscope is sitting.

It would be better all round if the microscope could come to the cells. And that is the solution proposed by P.W. Allen, a British company better known for supplying bomb-disposal equipment, and a team at St Bartholomew's Hospital in London, led by Iain Hutchison, a mouth surgeon. The Cy-Scope, as the result of this collaboration is called, is less a new invention than a piece of technology transfer. It is based on a device used to examine the interiors of jet engines for hairline fractures (one of P.W. Allen's sidelines). In the hands of Mr Hutchison, though, it is being used to look in patients' mouths for signs of oral cancer. With appropriate modification, it might also be employed to look for cervical, rectal and oesophageal cancer.

The principle behind the Cy-Scope is an old one: endoscopy. This involves either putting a camera on the end of a flexible rod and inserting it through a hole (natural or artificial) in the body; or making the rod itself out of optical fibres and having the camera outside the body.

Cy-Scope opts for the first approach. The difference is that its camera is a miniature microscope which can magnify up to 500 times, and which can be held against the epithelial cells lining the mouth. In practice, since the prototype is hand-held, the shaking of even the steadiest surgeon's hands means the effective maximum magnification is only 200 times. The use of "steady-cam" technology of the sort employed in television broadcasting should overcome that



Inside knowledge

limit, though. In any case, existing endoscopes can manage no better than 60 times, which is too little to see cell nuclei reliably.

Light is supplied to the lens by an optical fibre, and the resulting image is either examined on screen by an expert, or transmitted to a computer loaded with image-recognition software programmed to look for abnormalities. In the case of oral cancer, the giveaway is the distribution of the nuclei in the epithelial tissue. Normal epithelium has evenly distributed nuclei. Early signs of trouble include abnormal clustering of the nuclei, and areas of "white space".

So far, the technology has been used to assess 133 patients and has had a 100% success rate in revealing early symptoms of cancer. In two cases, the Cy-Scope picked up cancers that more conventional examinations had missed. And not only is it effective; unlike many medical advances, it is also cheaper than what it replaces. It will retail for about £5,000 (\$7,500). In contrast, a single biopsy with anaesthesia, follow-ups and pathologist's report cost around £1,000. So the accountants will love it, as well as surgeons and their patients.