have shown clearly that the selection of patients is very important.[1 3] The purple lesion will always respond better than the younger, pinker one, because with increasing age of lesion there is an increase in numbers of vessels and vascular ectasia, associated with a colour shift from pink to purple. In one recent study no patient over the age of 37 failed to achieve a desirable result,[3] while pink lesions generally responded poorly. Sometimes hypertrophic scarring developed after treatment of a pink test area. In most patients under 37 with a red or pink lesion a pretreatment biopsy proves helpful in predicting the outcome.[3] Favourable histological features include a fraction of dermis occupied by vessels amounting to over 5%, mean vessel area over 2500 μm^2, and the proportion of vessels containing red cells over 15%. Adverse factors in prognosis include age of patient under 17 years, pink colour of lesion, vascular area of below 2%, mean vessel area of below 1500 μm^2, and proportion of vessels containing erythrocytes below 3%.

This work, however, gives little comfort to parents of children extensively affected on cosmetically sensitive areas such as the face. At present, however, the inescapable conclusion is that children under 17 should not be treated with the argon laser; but about 60% of adult patients will do well—and with improved selection of patients the proportion could become much higher. Moreover, with painstaking technique the incidence of scarring after treatment with the argon laser on the face is about 2%—though other body areas, particularly those prone to keloids, are likely to show a higher incidence.[8]

A new development is the possibility of using a much more selective tunable dye laser emitting at 577 nm to treat portwine stains.[9 10] This emission corresponds to the absorption of light by haemoglobin; its maximum absorption is around 415 nm, but light at this wavelength is not transmitted as deeply into the dermis as an emission at 577 nm, which is also absorbed comparatively well by haemoglobin.

The histological pattern seen after treatment with a tunable dye laser at 577 nm is quite different from that with an argon laser. An acute vasculitis is produced in the upper dermis with a prominent perivascular neutrophilic response in the mid-dermis.[9] Though focal epidermal necrosis does occur it is minimal, and skin appendages and collagen are preserved. Moreover, the energy required to produce these changes is relatively small. The tunable dye laser emitting at 577 nm is therefore much more selective than the argon laser in that damage is confined mainly to the cutaneous vascular plexus. This greater selectivity may make treatment of portwine stains possible even in children, but much more work will be needed to confirm this optimistic speculation.

Meanwhile, we need to try to standardise nomenclature so that the increasing number of reports can be properly compared and to assess the usefulness of this treatment. Future studies should state the irradiance, laser beam cross-sectional area and shape, laser pulse duration or exposure time, pulse repetition rate, treatment times (with details of treatment intervals), total treated skin area, and the type of laser used with its spectral distribution.[11] A method of assessing the final results objectively is also vital, and skin colour measurements using reflectance spectrophotometry[12] should enable the technique to be refined.

J A COTTERILL

Consultant dermatologist,
General Infirmary,
Leeds LS1 3EX

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Qinghaosu: a new antimalarial

One of the main problems in tropical medicine today is the spread of resistance to chloroquine, hitherto our most dependable antimalarial for both treatment and protection. Chloroquine has been especially valuable in the control of malignant tropical malaria due to *Plasmodium falciparum*. In the past three years this parasite has developed resistance to alternative antimalarials such as the various combinations of sulphones or sulphonamides with pyrimethamine. This has meant that we could rely on none of the existing synthetic drugs with confidence. The "good old quinine" is still life saving in severe cases, even if tetracycline may occasionally be needed should the response be too slow.[1]

The outlook is serious, though not as critical as some authors have suggested. The recent report of the meeting convened by the Ross Institute provides a well-balanced appraisal of existing means of prevention.[2] Mefloquine, a valuable new compound synthesised and tested by the American Army research group, has not yet been released for wider use since the outcome of field trials is still awaited.[3] No wonder that the news of the Chinese discovery of a new and potentially valuable antimalarial has aroused such widespread interest.

As with many other advances in pharmacology, the new Chinese remedy is not really new. A herb called qinghao (chinghao) was first mentioned in the treatise *Fifty-two Prescriptions* discovered in the Mawangdui Han tomb of 168 BC. It was specified as a remedy for fevers in *Zhou Hou Bei Ji Feng* (handbook of prescriptions for emergency treatments) written by Ge Hong in AD 340, and later in the famous *Ban Cao Gang Mu* (compendium of materia medica) written in 1596 by Li Shizhen. The herb was later described by Linnaeus and given the scientific name of *Artemisia annua*. The genus *Artemisia* belongs to the family Compositae, common in northern countries. There are over 100 species of these hardy or half-hardy herbaceous perennials and shrubs growing in many parts of the world; several of them (sagebrush, wormwood, tarragon, absinth) are noted for their aromatic bitterness—whence the generic name, which refers to Artemisia, wife and sister of Mausolus, king of Halicarnassus in the fourth century BC (her sorrow on the death of the king

was so great that she mixed his ashes with whatever she drank to make it taste bitter). Two Asian species produce santonin, well known for its anthelmintic properties.

In 1972 Chinese scientists isolated the active principle of *Artemisia annua* and showed it to have the structure of a sesquiterpene lactone that they named qinghaosu or artemisinine. This compound is contained in the aerial parts of the plant with average yields of 0·3-0·5%. No other species of *Artemisia* examined until now has any antimalarial property. Preliminary studies confirmed the plasmodicidal effects of the active compound. In view of the importance of this discovery the World Health Organisation's Special Programme for Research and Training in Tropical Diseases convened in October 1981 a meeting in Beijing on the development of quinghaosu and its derivatives as antimalarial drugs.[4] The many excellent papers presented at this meeting by the Chinese chemists, pharmacologists, toxicologists, and physicians showed the immense amount of work carried out in China on the new compound. The Chinese not only have isolated and defined the active principle but also have evaluated its effect in animals and in man and have synthesised two derivatives (artemether and artesunate), assessed their action on *Plasmodium berghei* of rodents and *P cynomolgi* of monkeys, carried out extensive biochemical and pharmacokinetic studies, and followed up the therapeutic results in cases of malaria in several of their southern provinces. Preliminary reports indicate that artesunate may be superior to quinine for cerebral malaria resistant to chloroquine. The clinical use and the toxicity and teratogenicity of qinghaosu and its derivatives, however, raise some queries and require further studies. Nevertheless, the new compounds are of considerable promise and further intense collaboration has now been planned between the Chinese institutes and the WHO's Special Programme. This project is being given and deserves full support.

L J BRUCE-CHWATT

Emeritus Professor of Tropical Hygiene,
University of London,
Wellcome Museum of Medical Science,
London NW1 2BP

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Explosive bullets: a new hazard for doctors

American forensic journals have recently drawn attention to a new trend in gunshot wounds—the reappearance of exploding ammunition.[1-5] Explosive bullets present a considerable potential danger to both surgeon and pathologist—as well as causing frightful wounds in their victims.

The media seemed not to pick up the fact that in the assassination attempt last April on Ronald Reagan the president was shot with an exploding bullet which failed to detonate. Soon after the event the director of the Federal Bureau of Investigation laboratory disclosed that of the six bullets fired during the affray five were "Devastator" missiles, containing explosive material. The one that lodged in President Reagan's lung did not explode, but some of the lead azide from the charge spilled into the surrounding tissues and was removed during the surgical operation. Having learned that explosive ammunition was being used the surgeons, who later removed another bullet from the neck of a police officer hit during the incident, took special precautions to avoid detonating this second missile. Either bullet could have exploded during emergency surgery or might have been detonated if ultrasound or microwave techniques had been used for diagnosis.

Exploder ammunition is being used increasingly in the United States and is being manufactured both legitimately and covertly. The missiles used in the presidential shooting, Devastator bullets, are standard 0·22 long rifle ammunition modified by drilling out the bullet tips and inserting a tiny canister containing a lead azide charge.

These "advances" in the design of ammunition are claimed to allow law-enforcement personnel to reduce the risks both to themselves and to bystanders.[1] The aim is to transfer the kinetic energy of the bullet to the tissues of the target more quickly, so giving the missile greater stopping power and also reducing the risk to other persons from the exit of the bullet or a ricochet. This may be achieved by filling a hollow bullet with tiny lead shot beneath a plastic stopper; or using an exploding bullet, such as the Devastator. These modifications rapidly expand the size of the missile on detonation, so decelerating it faster and greatly increasing the energy transfer. The bullet may mushroom or fragment and destruction of tissue is likely to be increased.

The exploding bullet comes in various forms, but the common type has a tiny cylinder inserted into the tip of the bullet, commonly covered with a spot of yellow or red paint. The cylinder contains either black powder or a detonant such as lead azide. The cavity may contain a single lead shot and possibly a percussion cap and a tiny primer anvil. All these elements may be found on diagnostic radiography, at surgical exposure, or at necropsy. A suspicion that exploding ammunition may have been used should be aroused by finding a wound that is larger than usual, but Tate *et al* dispute any effect on the wound track.[2] Far greater fragmentation of the missile, as seen on radiography or visually, is also strongly suggestive—especially if a relatively low velocity weapon has been used. These effects occur only if the missile does explode, and in view of the apparently substantial failure rate the surgeon and pathologist need to be cautious. Their fingers and eyes are vulnerable to detonations of explosive missiles, during both handling the tissues and examining the missiles outside the body. In suspected cases they should wear goggles and use long-handled instruments to manipulate the missile during surgical operation or necropsy. Once removed, the bullet should be handled with long rubber-covered forceps and kept in a padded container to protect it from excess impact, vibration, and heat. Microwave equipment must not be used since it may trigger detonation.

Exploding ammunition has a long pedigree. These missiles were developed in the early 19th century for the penetration of barriers and the ignition of powder magazines, the invention being credited to a Captain Norton in 1822. In 1862 the British Army manufactured the Metford shell-bullet, which used mercury fulminate as the detonant. In 1897 the British arsenal at Dumdum in India began manufacturing mechanically expanding bullets for use against tribesmen on the north-west frontier. The Hague Convention of 1899 forbade the use of all such