

## **Surgical removal of tattoos by carbon dioxide laser<sup>1</sup>**

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Man has tattooed himself since history began. The introduction of carbon and other coloured dyes into the dermis and adjacent subcutaneous tissue by means of a needle remains the method of application. There is not, however, a method for the removal of tattoos which will produce a perfect cosmetic result. Excision of the whole area, followed by skin grafting, leaves the characteristic graft appearance. Dermal abrasion techniques, the application of local heat, exact excision of the motif by scalpel and subsequent suturing, are recent techniques which have been used with partial success.

The need for tattoo removal is often not appreciated. The patients most commonly have their tattoos applied during their teens and, within a few years, the tattoo is bitterly regretted. This is especially true of people entering business or matrimony. The psychological stress generated can interfere with the patient's personal life or career.

It was decided to investigate the carbon dioxide laser as a tool for tattoo removal. Ben-Bassat (1975) has shown that there is minimal ultrastructural damage to the skin after lasing. Mester (1975) has reported good skin healing clinically after lasing, and confirmed the result experimentally.

### *Experimental work*

An El-Op S. 20 CW carbon dioxide laser was used; this is a hand-held laser with free range of movement. The coherent radiation has a wavelength of 10.6  $\mu\text{m}$ . A power setting of 10 watts was found most suitable.

Selected areas on the flanks of 3 New Zealand white rabbits were shaved and prepared. Under general anaesthesia, tattoos were applied using Indian ink and a hypodermic needle (No. 1 Gillette). After one week, again under general anaesthesia, parts of the tattoo were lased. Biopsies of the tattooed and lased areas were taken. During the first forty-eight hours there was considerable serous discharge from the lased area. A vigorous inflammatory response ensued, and heavy crusty scabs were formed. Seven to ten days after lasing, these scabs started to come away. A well-healed incision site, devoid of carbon pigmentation, resulted. During the subsequent six weeks, further wound contraction occurred and a small scar was left.

*Results and conclusions:* The carbon dye was totally removed from the lased area. The early serous discharge and the crusty scabs were heavily loaded with carbon dye. There was a reduction of tattoo intensity in the area adjacent to the lased part, for a distance of about 2 mm. Histology of the biopsies of tattooed skin confirmed the presence of carbon particles intradermally and deeper. The lased area showed loss of the epidermis, dermis and superficial fascia for a depth of up to 5 mm. All the carbon had been completely removed from the lased areas.

The laser removes tattoo dye, which is probably ejected during the vaporization of the surrounding cells. There is a secondary loss of dye which is 'washed out' of the wound during the 'serous phase'. Finally, there appears to be further dye removal during healing; this may be due to macrophage activity. The final scar, after lasing, was cosmetically acceptable.

### *Case report*

Miss A S (aged 19) had four names tattooed on her left forearm when aged sixteen. The patient decided that she wished to start a career as a fashion model but the presence of the tattoos jeopardized this ambition.

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Under local anaesthesia (adrenalin with 2% lignocaine) the four names were removed using the El-Op S. 20 laser. Melolin gauze and Netelast dressings were applied. The wounds underwent an early phase of serous discharge. Within ten days heavy scabs had formed and cicatrin powder was applied. At five weeks the crusty scabs had come away, leaving a well-healed scar, devoid of pigmentation.

After twelve weeks, the scars had started to 'blanche' and contraction had commenced. The cosmetic appearance was adequate for 'proof' photographs to be taken for modelling schools.

Since this patient was treated, ten other patients have received treatment for their tattoos. Results at twelve weeks, from the series of ten patients, show good skin healing. In those patients who have tattoos with larger shaded areas, the area is lased in dots. Thus approximately half the tattoo is allowed to remain. After 6-8 weeks the residual unlased area is itself removed by lasing. In particularly intricate tattoos a third session may be necessary. The only discomfort experienced by the patients was the injection of local anaesthetic and a feeling of 'sun-burn' for a few hours after the local anaesthetic wore off.

### *Comment*

It is possible to remove tattoo dye from the skin by the carbon dioxide laser. The following three mechanisms are probably responsible, namely, mechanical ejection during lasing, the 'washing out' of dye by the serous discharge and the late macrophage removal as a part of the inflammatory reaction. The procedure can be performed under local anaesthetic and the laser is quick and easy to use.

Final evaluation will not be possible until two years have elapsed. After this period, optimal healing and wound contraction will have occurred. It is anticipated that fine scars will result. Although this method is not entirely free from scar formation, it is thought that the results of lasing may well prove to be an improvement on the results achieved by using existing techniques.

### **References**

- Ben-Bassat W (1975) In: *Laser Surgery*. Ed. I. Kaplan. Jerusalem Academic Press; p 95  
Mester E (1975) In: *Laser Surgery*. Ed. I. Kaplan. Jerusalem Academic Press; p 190

## **Metachronous carcinomas of the large and small bowel<sup>1</sup>**

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Following successful removal of a carcinoma of the large bowel, there is a 3.5% risk of developing a further primary (metachronous) large bowel tumour (Heald & Bussey 1975). Metachronous carcinomas affecting both large and small bowel, however, are very much rarer. The following report describes the progress of a patient with four primary malignant tumours of both large and small bowel over a period of twenty-two years.

### *Case report*

Mr W H first presented in December 1956, aged 52, when he underwent a right hemicolectomy for a Duke's grade C, moderately-differentiated adenocarcinoma of the ascending colon. In 1969 a palliative local resection was performed for a carcinoma of the descending colon which appeared to be infiltrating the posterior abdominal wall. However, histology showed a well-

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