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The Application of "Chemosurgery" in Cancer

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with the technical assistance of
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The microscopically controlled excision of cancerous tissue was conceived by Dr. Frederic E. Mohs in 1932 while he was a medical student at the University of Wisconsin. He coined the term "chemosurgery" to indicate that the tissues are chemically treated in situ and then surgically excised.

Mohs' chemosurgery technique represents a great advance in the management of superficial cancers which is only now being recognized as effective treatment for recurrent or radio-resistant tumors. Although it is a time-consuming procedure, it offers more assurance of complete eradication. The recurrence rate of basal cell carcinoma is only one half of 1% as compared with a 5% to 10% recurrence using other modes of treatment.

However, because the technique requires special training on the part of the physician and technician, it is still not widely available. (In Michigan, currently, only one other medical center offers it. And, in the U.S., there are presently only 45 qualified practitioners.)

Certain basal cell and squamous cell carcinomas are invasive in nature and recur after excision or after radiotherapy due to unpredictable or "silent" extensions beyond the clinically visible and palpable mass. This is why it is standard practice to excise or irradiate a generous margin of tissue around the tumor. However, despite such precaution there is no assurance that all outgrowths have been eradicted. Chemosurgery eliminates this uncertainty by following the "silent" extensions microscopically to their terminations. By adopting this technique, more thorough removal of the tumor is possible with minimum sacrifice of normal tissues.

The microscopically controlled excision is carried out in multiple stages by the systematic use of frozen tissue sections. The steps of the procedure are:

1. Removal of the main tumor mass by curette ment. This step reduces the number of stages...
Figure 1
Squamous cell carcinoma of left cheek.
The Application of “Chemosurgery” in Cancer

of the procedure. However, it may preferably be omitted in the case of tumors on the nose, the ear and the eyelids to avoid undue sacrifice of normal tissue.

(2) Application of a zinc chloride paste to fix the tissues in situ. The paste’s action is similar to that of formalin: it brings about the death of the cells but preserves tissue architecture.

(3) From three to 24 hours later, a 2-3 mm layer of tissue is excised with a scalpel, usually in sections about one centimeter square in size. The edges of each section are marked with dyes and oriented to a map drawn on paper and to markings made on the lesion with mercuriochrome.

(4) The undersurface of each piece of excised tissue is sectioned horizontally, immediately stained and examined microscopically to determine the exact location of cancer cells.

The entire procedure is repeated in depth and in neighboring areas until a cancer-free undersurface is found. After about a week a final layer of fixed tissue separates and the lesion heals rapidly, usually without the requirement of corrective plastic surgery. However, should this be necessary, the plastic surgeon will have a clean granulating wound for repair.

Illustrative Case

A 71-year-old male (M.R. #136 68 84-1) was referred by a physician for the treatment of a 7.9 x 5.7 cm squamous cell carcinoma of the left cheek (Fig 1). The patient had received fractionated radiotherapy: 4,000 r at 1 mm. A half-value-layer, delivered during the period December 2, 1968 to January 3, 1969, was without benefit.

Figure 2
Mohs' chemosurgery was begun on 4/1/69 after excision of the main tumor mass. The subsequent stages are illustrated diagrammatically in Fig 2-6. After separation of the final layer the wound was 10.7 x 7.3 cm in diameter (Fig 7). Histologic examination of sections revealed a highly invasive squamous cell carcinoma (Fig 8) which involved the parotid gland and the tissues around the facial nerve. The latter had to be sacrificed, resulting in left facial paralysis. Wound healing proceeded very rapidly and was almost complete eight weeks after separation of the final layer (Fig 9). Because of the facial paralysis, tarsorrhaphy was performed for protection of the eyeball by Philip C. Hessburg, M.D.

ACKNOWLEDGMENT

It was through the encouragement and unfailing help of Dr. Clarence S. Livingood* and Dr. Robin C. Buerki** that chemosurgery was introduced into the Department of Dermatology at this hospital in 1968. Dr. Buerki, as superintendent of Wisconsin General Hospital, also aided Dr. Mohs in establishing the first chemosurgical clinic at that hospital about 20 years ago.

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** Executive Director
Figure 7

Wound ten days after termination of chemosurgery. The final layer had separated.
Figure 8
Photomicrograph of a positive section.
Figure 9
Site of removal of tumor nine weeks after termination of chemosurgery. Note tarsorrhaphy sutures.
REFERENCES

