

# ALTERED LYMPHATIC CIRCULATION AT THE SITE OF MELANOMA EXCISION

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## ABSTRACT

*Local excision of malignant melanoma promotes both disruption and regeneration of regional lymphatics. These disturbances in local lymphatic drainage favor escape of residual melanoma cells either locally or in transit from more distal sites. Accordingly, a wide tridimensional resection to eradicate all local tumor and circumvent interstitial entrapment and migration of melanoma cells is still advocated. Changes in lymph vessels after excision also demand caution when distal endolymphatic isotopes are administered. Lymph leakage and trapping with overconcentration of the isotope may result in excess local irradiation and skin breakdown.*

Inasmuch as lymphatic dissemination of malignant melanoma is an important and often primary pathway of transporting melanoma cells, alterations in regional lymphatic drainage bear on treatment policy.

This study demonstrates changes in regional lymphatics after local excision of a peripheral malignant melanoma.

## DYNAMICS OF LYMPHATICS IN THE LOWER EXTREMITIES

Ordinarily when ethiodized oil is injected into a peripheral lymphatic the medium is transported throughout the lymphatic network with only a slight delay before deposition in regional lymph nodes (1). The radiopaque material remains within lymphatics from three to six hours and normally completely drains within 24 hours. In contrast to blood flow, lymph flow is extremely slow or stagnant when the extremity is dependent. With the patient horizontal, it may take from one to two hours to inject

10ml of ethiodized oil using a constant pressure infusion pump. Accordingly, following intralymphatic administration of ethiodized oil, serial roentgenograms provides an index of the lymphatic distribution pattern.

## LOWER EXTREMITY LYMPHATICS

The lymphatic trunks of the lower extremity typically follow the course of the greater saphenous vein (saphena magna system). These lymphatics vary from 0.25 to 1 mm in diameter, usually retain their caliber as they ascend toward the inguinal region and commonly follow a straight course to end abruptly. When radiopaque contrast is injected into a dorsal pedal lymphatic (Fig. 1A) regional lymphatics are visualized as one or more trunks course proximally, converge toward the knee, and ascend in the antero-medial aspect of the thigh to divide into 12 to 16 channels before entering superficial inguinal lymph nodes. If the opaque material is injected into a peripheral lymphatic along the lateral aspect of the foot, however, lymph channels course proximally toward the popliteal space (saphena parva system) (Fig. 1B) where one or two popliteal nodes are commonly encountered. The latter are seen routinely in dogs, but are frequently absent in patients. The lymphatics course proximally to deeper lymphatics and join superficial inguinal channels which traverse the thigh and extend mesially to enter the groin in juxtaposition to femoral blood vessels. Along the course of lymphatics numerous valves prevent backflow. It is within this network that melanoma cells are transported to regional lymph nodes (Fig. 2).

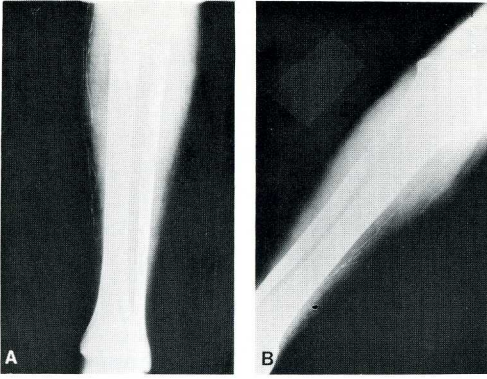


Fig. 1A: Normal lymphogram performed by the injection of Ethiodol into the lymphatics of the dorsum of the foot. Note the even contour of peripheral lymphatics. Melanoma was present on the anterior aspect of the mid-leg.

B: Normal lymphogram demonstrating deep postlateral lymphatics which drain to the popliteal space. A malignant melanoma was present on the posterior aspect of the leg inferior to the popliteal space.



Fig. 2: High power microphotograph demonstrating melanoma cells within a lymphatic.

### EFFECTS OF LOCAL EXCISION OF MALIGNANT MELANOMA UPON REGIONAL LYMPHATICS

In contrast to the smooth, even caliber of intact (but relatively few) lymphatics which traverse the site of a malignant melanoma, excision disrupts lymphatic flow. As a result there is an escape of lymph and injected material into adjacent tissues sometimes forming a "lymphocyst" and commonly stimulating an increase in number of

lymphatics at the site of excision. The mechanism of a delayed lymphatic regrowth is poorly understood but likely represents an ingrowth of endothelium (angiogenesis) to meet the metabolic demands of injury incurred by operation. Fig. 3 illustrates a lymphogram obtained one month after local excision of a malignant melanoma and demonstrates escape of contrast into surrounding tissues and proliferation of lymphatics at the excisional site.

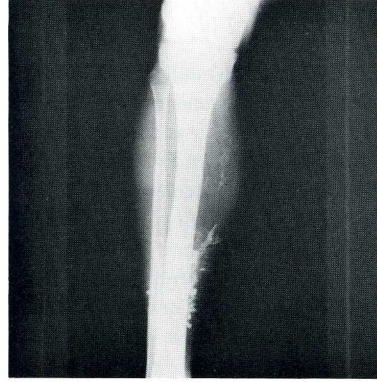


Fig. 3: A lymphogram performed one month after local excision of malignant melanoma on the anterior aspect of the leg. Note the haphazard abundance of injected contrast at the site of excision. This area represents a locus for residual melanoma cells to be trapped and appear later as a local tumor recurrence.

### COMMENT

After biopsy or local tumor excision the regional lymphatic circulation is disrupted. If tumor cells (in this instance melanoma) are left behind they may escape into the interstitium with pooled lymph where they may subsequently grow and form a local recurrence. Moreover, as melanoma and other tumor cells are ameboid, escape from the confines of the intact lymphatic system permits interstitial migration to adjacent sites where they may become entrapped and grow. This accounts for tumor recurrence both at the site of local excision and in the nearby vicinity. Furthermore, melanoma cells distal to the site of local excision may later be transported proximally by lym-

phatics to the operative site where interstitial lymphatics are disrupted, "leak" into the interstitial space and form a "recurrence."

Another consideration is that lymphatic disruption may favor local sequestration and concentration of radioactive isotopes injected into distal lymphatics for therapy. As previously described (2,3) endolymphatic infusion of radioactive Ethiodol shows clinical promise of controlling certain melanomas residing in regional groin or axillary lymph



Fig. 4: A healing radiation ulcer following endolymphatic administration of 20 millicuries of I-131 Ethiodol to the patient whose lymphogram is shown in Fig. 3. The ulcer gradually healed.

nodes. Some evidence exists that this mode of therapy also helps control "in transit" metastases within lymphatics. Proliferation of lymphatics at the site of excision of malig-

nant melanoma thus serves as "reservoir basins" to entrap endolymphatic radioactive isotope for a greater tumorocidal effect. On the other hand, greater concentration of isotope also carries the potential risk of delivering unduly large doses of local irradiation. Fig. 4 shows skin ulceration (at the site of melanoma excision) induced by dorsal pedal endolymphatic administration of radioactive isotope (I-131 Ethiodol). The author has also seen a patient in Lausanne, Switzerland, treated by endolymphatic radioactive gold in England, who developed a huge "radiation ulcer" at the site of local tumor excision performed before endolymphatic isotope administration. Accordingly, caution needs to be exercised in choosing the dosage of radioactive isotopes administered endolymphatically after local excision of melanoma because of pooling of lymph with disruption and limited regeneration of regional lymphatics.

#### REFERENCES

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