

The Indirect Lymphangio-fluoroscopy: A Method for the Visualization "In Vivo" of the Lymphatic System. Experimental Research

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The starting point of this research has been offered us by the studies of Tours's School concerning the use of fluorescent compounds (Gouaze and others, 1964-65; Soutoul and others, 1966).

Our procedure of lymphangio-fluoroscopy consists in the injection into the tissues of a solution of sodium 4-4' bis 4-anilino-6-amino-2-2'-stilbendisulphonate ("4-4' SDS"*) . This compound, under Wood's light, enables the lymphatic vessels draining the site of injection to be early, completely and constantly visualized and produces no change in their appearance even when administered repeatedly (Figs. 1-2).

The solution of "4-4' SDS" in the used concentration has a 8.7 pH and it is easily sterilizable because it remains constant at 100 °C. The Wood's light has been obtained by two Philips H.P.W. lamps of 125 W.

Research work was performed with experimental animals (rat, rabbit and dog), narcotized. The exhibition of the regional lymphatic vessels was obtained either by means of anatomic dissection of the surface tissues or by previous laparotomy or thoracotomy for the deep organs (Pace, Cardona, 1968; Pace and others, 1970-72).

*) -Bis-anilino-bis-diäthanolamino DASD-verb-Vers. 227 Gü - Dr. Günter 932/106 - CIBA (Basel, Switzerland

Table 1 Properties of 4-4' SDS

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|---|
| 1) Swift drainage only through the lymphatic vessels when it is injected into the tissues or organs |
| 2) The fluorescence of the lymphatic vessels is shown by Wood's light. |
| 3) The appearance of the local and regional lymphatic drainage is obtained in a few seconds and persists for many minutes |
| 4) The advance of the fluorescent substance rapidly passes through loco-regional lymph nodes following the lymphatic flow up to the venous confluence |
| 5) The lymphatic drainage can be easily seen adding an artificial light to Wood's light. |
| 6) The substance cannot be seen without the ultraviolet lighting; this protects from the disadvantage of incidental leakage during a surgical operation |
| 7) The substance has never presented during its use any acute or chronic phenomena of local or general toxicity. |

The properties of "4-4' SDS" pointed out during the experimental research are summarized in Table 1.

The method of indirect lymphangio-fluoroscopy we used offers considerable advantage in comparison to hydrosoluble vital dyes employed for the visualization of the lymphatic drainage; this advantages are resumed in Table 2.

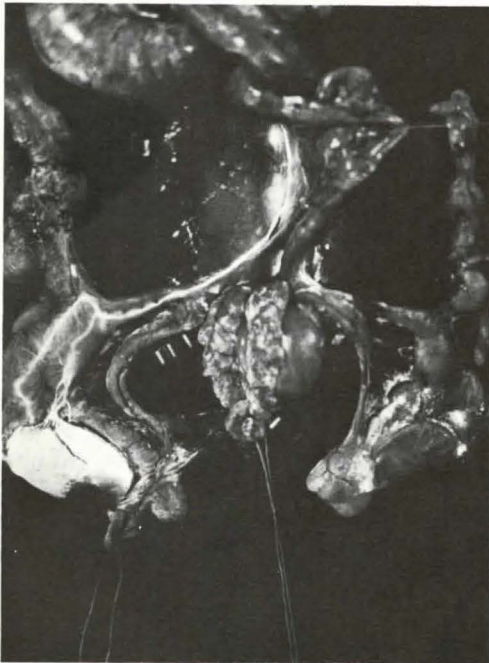
On the ground of obtained results, this method can be applied for a more physiological dynamic study of lymphatic circulation compared to direct lymphangioscopic methods; it allows an anatomical study of the lymphatic system



Fig. 1 Wood's light associated with artificial light. Visualization of lymphatic drainage from thyroid gland in the dog by intraparenchymal injection of "4-4'SDS"

Table 2 Advantages of "4,4'SDS" in comparison with hydrosoluble vital dyes

visualization of the lymphatic vessels is	<ul style="list-style-type: none"> — ready — constant — widespread from the point of injection
the singling out of the lymphatics is easier because of	<ul style="list-style-type: none"> — the brilliant light-bleu colour — the easy distinction from the venous vessels — the minor disadvantages caused by incidental leakage
the substance is colourless without ultra-violet light	
the colour does not persist on the skin and the mucous membranes	



under normal conditions; a visualization of the lymphatic drainage can be obtained in natural or experimental pathology during the surgical operations; it can be applied particularly to the study of the accomplishment of the lymphatic drainage in transplanted organs.

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Fig. 2 Indirect lymphangio-fluoroscopy: visualization during laparotomy of lymphatic vessels (spermatic cord and aortoiliac chain) of the testis in the rat

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