Table 1. Lymphocyte phenotype from 25 reactive and 24 neoplastic effusions (median, range)

Surface markers	Reactive	Neoplastic
CD3	80 –(50–95)	76.5–(62–96)
CD4	59.5–(28–84)	54 –(17–64)
CD8	25 – (9–58)	20 –(11–47)
HLA-DR	20 – (6–45)	37 – (6–84)
CD57	9 – (1–73)	5.5– (1–42)
CD16	4 – (0–44)	6 – (0–25)
CD56	12 – (1–70)	9.5– (1–46)
CD3+/56+	3 – (0–44)	2 – (0–20)
CD3+/DR+	12 – (4–30)	26.5– (2–56)
CD19	6 –(0.5–17)	8 – (3–24)

4/CD3, Leu 3/CD4, Leu 2/CD8), B cells (Leu 12/CD19), natural killer (NK) cells (Leu 7/CD57, Leu 11c/CD16, Leu 19/CD56), and activated lymphocytes (HLA-DR) (Becton Dickinson). 3000–5000 small cells (lymphocytes) were counted on a 'FAC-Scan'. Large cells (macrophages, mesothelial, and cancer cells) were excluded from analysis. The number of lymphocytes was about 10^5 per ml; the total number was estimated by CD45+ cells only. The same set of markers and procedure were used to analyze the peripheral blood lymphocytes from 10 patients with breast cancer whose effusions had also been examined.

Results in 5 reactive effusions free of cancer cells but from cancer patients were not significantly different from those of the other reactive effusions. The data obtained with the different markers are shown in Table 1. In agreement with earlier results [4–6] we observed in all types of effusion an increase of the ratio of T to B lymphocytes and of the ratio of CD4 to CD8 subtype T cells compared with peripheral blood. This conclusion is further supported in the 10 breast cancer patients whose peripheral blood was simultaneously examined, and in 1 patient with chronic lymphocytic B leukaemia: while in the blood over 95% of lymphoid cells were of B (leukaemic) type, in the effusion 94% of lymphocytes were of the T subset. The reason for selective accumulation of T (mainly helper) cells in effusions is not clear, but it might be an indication of host reactivity against cancer cells.

In agreement with Rathmell *et al.* [6] we found no significant increase in HLA-DR+ cells in effusions free of tumour cells from our 5 cancer patients. In contrast, in effusions containing cancer cells, we found a significant increase in activated T lymphocytes. Relative mean (S.D.) values for HLA-DR+ were 21.8 (9.6) in reactive effusions and 38.9 (22.3) in neoplastic effusions ($P = 0.001$, Epistat test). Corresponding figures for CD3+/DR+ were 14.8 (7.6) and 29.0 (20.6) ($P = 0.002$).

We can exclude the possibility of these results being falsely influenced by the presence of cancer cells. It is known that the antigen recognized by the anti-HLA-DR monoclonal is not expressed only by lymphocytes (thymic epithelial cells have for instance been reported to be positive as well [7]). However, the window of our scanner was adjusted to exclude large cells such as cancer cells and to accept only small lymphoid cells. In addition, the increase in HLA-DR+ cells in effusions did not correlate with the number of cancer cells (which, in single cases, varied 10–85%). The total number of lymphocytes was higher in effusions containing cancer cells 11.24 (19.95) $\times 10^5$ than in reactive effusions (3.18 [3.77] $\times 10^5$), but there was no significant change in the relative number of B lymphocytes in the two groups of effusions. On the contrary, increased HLA-DR+ T lymphocytes correlating with the presence of cancer cells in effusions suggested active host cellular response to tumour cells.

These data concur with observations [8–10] on the accumulation of activated T lymphocytes in solid tumours and suggest that the relative percentage and characteristics of cell types in the effusion may result from an active equilibrium between proliferating cancer cells and reactive elements. Lymphocytes in neoplastic effusions may be a convenient source of activated tumour infiltrating lymphocytes that could be used in tumour therapy.

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Long-Term Use of an Implantable Venous Catheter

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LONG-TERM venous access is essential during chemotherapy. Implantable catheters have been used for such access and may reduce many of the problems of percutaneous catheters. We have tested one such catheter.

37 patients had 38 devices implanted during 1 year. One surgeon did the implanting. Delivery of chemotherapeutic agents was the main indication in 30 patients. 7 patients needed long-term access because of repeated acute treatments and lack of peripheral veins. The patients were aged 24–87 (mean 44).

The 'Thera Port' was bought from Baxter Travenol (Stockholm). It consists of a titanium-polyurethane reservoir with a pressurized, self-sealing silicone membrane (Fig. 1). The base of the chamber is 27×27 mm with a hole in each corner for fixation. The chamber is 11.5 mm high and the septum diameter is 12 mm. A radio-opaque silicone catheter (internal diameter of 1.0 mm) connects to the reservoir's side-tube. The internal volume is 0.35 ml. Implantation is done under local anaesthesia with surgical cut-down to the vein. For proper placement, the tip of the catheter should be in the lower part of the superior vena cava at the entrance of the right atrium, confirmed by fluoroscopy. A subcutaneous pocket is prepared just beneath the clavicle, incising as far above the puncture area as possible and making the pocket as small as possible to prevent dislodgement. The catheter is connected to the side-tube after the system has been filled with heparinized saline. The system is flushed with 5 ml heparinized saline (50 IE/ml) and the incisions closed in one layer. 40 mg gentamicin is injected in the pocket before closure. The system is ready for immediate use.

Huber needles (19 and 22 G) are used to avoid damage to the silicone. Asepsis is strict when accessing the system. During repeated daily injections or during infusion, a bent Huber needle is left in place and changed every 3 days. Each time the system is used and every 3 weeks, it is flushed with heparinized saline.

To date, the devices have been in place for a cumulative time of 8090 days (15–675, mean 231). There were 418 punctures of the reservoirs, mean 11 per membrane and ranging up to 48. The chamber was easily punctured and there was no septum damage, extravasation, leakage, or skin necrosis. Difficulties in aspirating blood occurred in about one-fifth of patients but injection was never impaired.

There were no complications associated with the surgical implantation. Complications occurred in 6 patients (16%), who were receiving chemotherapy (4) or nutritional support (2). 2 patients had sepsis and the system was removed. 1 of these had porphyria and a chronic rare skin disease and 2 reservoirs had been implanted: both were removed 4 and 6 weeks after implantation. 2 patients developed a fibrin sleeve on the catheter tip, but injection was unaffected. Thrombosis of the axillary or subclavian vein occurred in 2 patients 2 and 3 weeks after implantation. Both systems were removed and later implanted on the left side.

Our experience confirms the superiority of an implantable catheter system over percutaneous catheters. It is commonly believed that percutaneous placement is faster and has a lesser risk of infection than open dissection[1]. The operative time for percutaneous placement is about 55 min[2] compared with about 60 min for cutdown in our patients. The percutaneous technique is hampered with intraoperative complications (pneumothorax, arterial puncture or uncontrolled bleeding, and even mortality)[3,4]. Although possibly safe in the hands of an experienced surgeon, the implantation of these catheters is often done by a less experienced surgeon. With cut down, intraoperative complications can be avoided and the implantation done by a junior surgeon. In 14 patients the ports were not secured. Seeing no dislodgement, we think that securing the reservoir is unnecessary if the pocket is small. Instead it is possible to place the incision far from the puncture-area which may decrease infectious complications and allows the system to be used on the same day. The frequency of thrombosis was similar to that in other studies[5–7].

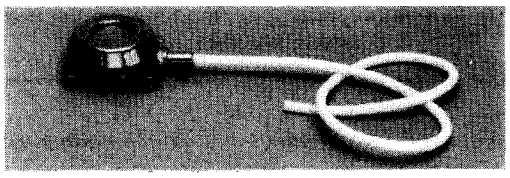

Fig. 1. The Thera Port.

The Thera Port has a low profile which is an advantage in thin patients. The low profile and use of light-weight material is probably more comfortable for the patient and gives a good cosmetic appearance. In overweight patients, however, the port may be more difficult to palpate.

Implantable catheters are accepted by patients and should be inserted for repeated cycles of chemotherapy. Except for a flush with heparinized saline every third week, these catheters are free from maintenance. They may prove to be more cost-efficient than percutaneous catheters which need dressing and cleansing every third day.

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