

## The Use of Neoplastic Donors to Increase the Donor Pool

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### ABSTRACT

The aim of the study was to evaluate the experience of the Centre-Sud Transplant Organization (OCST) area using cadaveric donor with neoplastic diseases to evaluate the possibility of transmission to recipients. From January 1, 2003, to December 31, 2010, the neoplastic risk has been reported to be 5.4% (377/4654 referred donors). In 2003, the number of donors with a tumor and their mean age were respectively: 60 (10.3%) and  $59.6 \pm 19.9$ ; 2004: 33 (5.2%) and  $61.4 \pm 15.9$ ; 2005: 32 (6%) and  $62.8 \pm 15.5$ ; 2006: 46 (7%) and  $60.7 \pm 19.1$ ; 2007: 51 (7%) and  $58.9 \pm 16$ ; in 2008: 58 (7%) and  $59.7 \pm 19.6$ ; 2009: 47 (7%) and  $57 \pm 26$ ; 2010: 49 (7%) and  $64 \pm 16$ . The organ most affected by tumor has been the central nervous system (18%). The tumor was diagnosed before in 325 (86%) cases, versus during organ retrieval in 48 (12.7%) donor operations but before, which four cases (1%) occurred after transplantation. According to the histological types and grades, 28 evaluated donors (8.2%) were suitable for transplantation. The histological types were: thyroid carcinoma ( $n = 3$ ); prostate carcinoma ( $n = 8$ ), renal clear cell carcinoma ( $n = 7$ ), oncocytoma ( $n = 1$ ), meningiomas ( $n = 2$ ), dermatofibrosarcoma ( $n = 1$ ); verrucous carcinoma of the vulva ( $n = 1$ ), colon adenocarcinoma ( $n = 1$ ), grade II astrocytoma ( $n = 1$ ), adrenal gland tumor ( $n = 1$ ), gastric GIST ( $n = 1$ ), oligodendroglioma ( $n = 1$ ). Forty-five organs were retrieved (22 livers, 19 kidneys, 3 hearts, and 1 pancreas) and transplanted into 44 recipients with 1 liver-kidney combined transplantation. Four recipients died due to causes not related to the tumor. No donor-transmitted tumor was detected among the recipients. Donation is absolutely not indicated in cases of tumors with high metastatic potential and high grades. Performing an accurate evaluation of the donor, taking into account the histological grade, currently can allow, organ retrieval and transplantation with an acceptable risk.

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**I**N THE RECENT PERIOD the organization and maintenance of a donor have improved such that age is no longer an absolute contraindication even for inclusion on the recipient waiting list. Over the last decade the utilized donor pool in Italy there has increased from 14.2 per million people (pmp) in 2000 to 18.2 pmp in 2010 combined with a progressive increase in the average age of the utilized donors. However it is known that the incidence of malignant disease increases with age. To reduce the risk of disease transmission from donor to recipient, the Italian National Transplant Centre (CNT) in 2001 issued the "Guidelines for the assessment of suitability of the donor" and established a "second opinion group," a panel of experts who can be consulted regarding donors with specific transmissible diseases. The aim of our study was to evaluate the incidence of donors with neoplastic disease in the

period from January 2003 to December 2010 in the Centre-Sud Transplant Organization, which operates the center in the south of Italy, as organized in nine regions with about 23,000,000 inhabitants.

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**Table 1. Histological Type of Neoplasia for the Utilized Donors and Type of Transplanted Organs**

No. of Donors/Histological Type	No. and Type of Transplanted Organs
7/kidney cancer	5 livers 2 kidneys 1 pancreas
8/prostate cancer	5 kidneys 6 livers
1/oncocytoma	1 heart 1 liver 1 kidney
2/grade I meningiomas	2 livers 1 heart 4 kidneys
1/colon adenocarcinoma	1 liver
1/dermofibrosarcoma	1 heart
1/grade II astrocytoma	1 liver 2 kidneys
3/thyroid cancer	2 livers 3 kidneys
1/adrenal gland cancer	2 kidneys 1 liver
1/oligodendroglioma	1 liver
1/verrucous cancer of the vulva	1 liver
1/gastric GIST	1 liver

## MATERIALS AND METHODS

The CNT promulgated “Guidelines for the assessment of suitability of the donor” in 2001. This document was revised in 2008. Moreover, the CNT in 2001 established the “National Register of Neoplastic Donors” that collects information on all donors with cancer considering their age, tumor site, histological type, mode of identification, type of transplantation and recipient follow-up.

## RESULTS

From January 1, 2003, to December 31, 2010, the incidence of neoplasia was 5.4% (377/4654 referred donors). In 2003, the number of potential donors with tumors and their mean age were 60 (10.3%) and  $59.6 \pm 19.9$  respectively (overall median 62.5; male: 36, female: 24); in 2004: 33 (5.2%) and  $61.4 \pm 15.9$  (median 63, male: 19, female: 14); in 2005: 32 (6%) and  $62.8 \pm 15.5$  (median 65.5, male: 20, female: 12); in 2006: 46 (7%) and  $60.7 \pm 19.1$  (median 64.5, male: 25, female: 21), in 2007: 51 (7%) and  $58.9 \pm 16$  (median 61, male: 29, female: 22), in 2008: 58 (7%) and  $59.7 \pm 19.6$  (median 67, male: 29, female: 29), in 2009: 47 (7%) and  $57 \pm 26$  (median 60, male: 24, female: 24), in 2010: 49 (7%) and  $64 \pm 16$  (median 68, male: 35, female: 14).

The organ most affected by tumor has been central nervous system (18%). The tumor was diagnosed before organ retrieval in 325 (86%) cases, in 48 (12.7%) during the donor operation but before the transplant, and in four cases (1%) after transplantation. According to the histological types and grades, 28 donors (8.2%) were evaluated to be suitable (Table 1). The histological types were: thyroid

carcinoma ( $n = 3$ ); prostate carcinoma ( $n = 8$ ), clear cell carcinoma of kidney ( $n = 7$ ), oncocytoma ( $n = 1$ ), meningiomas ( $n = 2$ ), dermofibrosarcoma ( $n = 1$ ); verrucous carcinoma of the vulva ( $n = 1$ ), colon adenocarcinoma ( $n = 1$ ), grade II astrocytoma ( $n = 1$ ), the adrenal gland tumor ( $n = 1$ ), gastric GIST ( $n = 1$ ), and oligodendroglioma ( $n = 1$ ). Among those donors 45 organs were retrieved (22 livers, 19 kidneys, 3 hearts, and 1 pancreas) and transplanted in 44 recipients (1 liver-kidney combined transplantation). The organs from 349 donors were evaluated to be unsuitable based upon the histological types and grades (Table 2). The recipients of organs from four donors succumbed during the perisurgical period due to causes not related to the neoplasia and therefore were not considered in the follow-up evaluation. Their neoplastic diseases were oncocytoma, grade I meningiomas, dermatofibroma, or papillary thyroid microcarcinoma. Among the remaining recipients, the average follow-up among transplanted patients has been 56.14 months with no observed donor-transmitted tumor.

## DISCUSSION

Despite the increase in cadaveric donations during the last years, the offers do not balance the demand for transplantation. At the same time, the indications for transplantation have increased, especially for terminal diseases of life-saving organs such as the liver and heart. Consequently an increased number of patients are awaiting transplantation albeit slightly. Thus, efforts to expand the organ donor pool are a high priority. In the meantime acceptable organ quality must be guaranteed without exposing recipients to unacceptable risks.

In the case of tumors it is mandatory to identify the histological type and grade to perform transplantation with a low risk of disease transmission. According to the literature.<sup>1-3</sup> as well as in our experience, there was no disease transmission in transplanted recipients with organs from

**Table 2. Histological Type of Neoplasia for the Donors Not Utilized for Transplantation**

Histological Type of Neoplasia	No. of Donors Not Utilized for Transplantation
Kidney cancer	29
Prostate cancer	61
Thyroid cancer	10
Central nervous system neoplasia	62
Skin carcinoma	7
Breast cancer	30
Lymphoma/leukemia	52
Bladder cancer	4
Ovarian cancer	11
Uterine cancer	5
Gastrointestinal cancer	43
Lung cancer	5
Other	30
Total	349

donors with low-grade malignant tumors. The low incidence of malignant disease transmission from donors to recipients was probably due to the reactivity of the immune system to recognize tumor cells from donor as nonself and delete them. Our analysis showed that application of guidelines to evaluate donor suitability and careful characterization of the tumor before transplantation can afford the use of the lifesaving organs, especially for recipients in specific clinical conditions that limit the risk of disease transmission.

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