

The Spanish National Transplant Organization (ONT) Tumor Registry

Gregorio Garrido and Rafael Matesanz

Background. It is important to know the actual risk of tumor transmission from donor to recipient and the serious consequences for the recipient. Tumor registries can help us to improve our knowledge about this problem.

Methods. We have studied all the donors registered in the Spanish National Transplant Organization from January 1, 1990, to December 31, 2006, and especially the donors with a malignant tumor as well as the recipients who have received an organ from these donors.

Results. We found 117 donors with a malignant tumor (5.8 per 1000 donors). One hundred fifty-five recipients were transplanted with an organ from these donors. The average age (SD) of donors with tumor was 53 (17) years. The most frequent cause of death was cerebral stroke in 81 donors. Donors with tumor are older than donors without tumor. The cause of death was cerebral stroke more frequently in donors with tumor than donors without tumor. Twenty-two of the recipients who received an organ from a donor with a tumor are dead. In 7 of these 22 recipients the death was cancer-related. Only 13 of the 100 recipients studied developed a malignant tumor, and only 10 of these tumors were donor-related.

Conclusions. The profile of a donor who could have a tumor was most frequently an elderly person who had died of a cerebral stroke. In our experience, the risk of tumor transmission from donors to recipients is low and depends on the aggressiveness of the donor tumor.

Keywords: Tumor, Transmission, Transplant, Donor.

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Neoplasias can be transmitted to immunosuppressed patients and animals when organs from donors with neoplastic diseases are unknowingly transplanted into recipients (1).

The frequency of malignant tumor donors and the transmission risk of donor-recipient tumor are not known exactly. However, today we have available abundant information in regard to this subject thanks to the United Network for Organ Sharing Registry (2, 3), Israel Penn Transplant Tumor Registry (2), the Italian experience through the Centro Nazionale di Trapianti (4), and the Spanish National Transplant Organization (ONT) registry.

On the other hand, the accidental transmission risk of a tumoral disease from a cadaver donor to a recipient should be examined with perspective, because most of the cases reported until now correspond to the primary stage of the transplants. Although there are now some transmission cases published (5, 6), after more than 300,000 solid organ transplants performed only a minimum percentage of the recipients have developed a transmitted malignant disease. Nevertheless, because of the serious consequences that this entails, it is obligatory to carefully select all potential donors with the intention of avoiding the transmission of these types of diseases.

Also, we cannot forget the fact that the progressive increase of the need for organs for transplant along with the shortage of available donors forces us to reconsider the concepts used until now that guide the acceptance of donors diagnosed with tumors (7). In this sense, the transplant coordinators and the members of the transplant teams need guidebook proce-

dures that help them to manage their complex situations with security, although ultimately the treatment of each case will be individualized.

For this reason, in 1996 the ONT published a consensus document called "Standardization of organ donor screening to prevent transmission of neoplastic diseases" (8). In this document, we introduced guidelines describing what to do when we discover a tumor in a donor.

To improve the knowledge about the frequency and risk of malignant tumor transmission from donors to recipients, the ONT, in 1990, began a registry of all donors with a malignant tumor, in Spain. Also, we have information about the recipient evolution when he or she has received an organ coming from a donor with a malignant tumor.

The aim of this article is to show the main results of the ONT tumor registry.

MATERIALS AND METHODS

This study includes all the donors registered in the ONT from January 1, 1990, to December 31, 2006. Especially, we have registered the donors with a malignant tumor according to the consensus document previously described (8). In all these donors, the tumor was always diagnosed after the organ's removal. Also, we have studied the recipients who received an organ from these donors.

The variables studied have been, from the donor, the age, sex, cause of death, and tumor localization and pathology; from the recipient, the age, sex, organ transplanted and transplantectomy (whether it was performed or not); and finally, from the recipients' follow-up, the evolution (whether the recipient is dead or alive), graft failure, and tumor transmission.

We have described the quantitative variables with the mean and standard deviation, and the qualitative variables with percentages. For comparing quantitative variables we

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used the *t* test, and for comparing qualitative variables we used the chi-square test. The level of significance for all contrast was 0.05. The magnitude of the association between two qualitative variables was calculated using the odds ratio with 95% confidence interval.

RESULTS

We found 117 donors with a malignant tumor of 20,016 donors registered in the ONT during the period 1990 to 2006. The rates we found were 5.8 per 1000 donors. A total of 155 recipients were transplanted with an organ from these donors with a malignant tumor.

The characteristics of 117 donors with tumor are as follows: the average age (SD) was 53 (17); 69% were men and 31% were women; the cause of death was cerebral stroke in 81 (69%), tumor in 21 (18%), cranioencephalic (CE) injuries or trauma in 13 (11%), anoxia in 1, and another cause in 1.

The localization of tumors detected was kidney in 55 (47%) tumors, central nervous system in 32 (27%), prostate in 5 (4.2%), and others in 25. The pathologies in these tumors were 54 (46%) adenocarcinoma, 9 (8%) glioblastoma, 14 (12%) astrocytoma, and 40 others.

We looked for differences between the donors with tumor and donors without tumor. The donors with tumor are older than the donors without tumor (53 years vs. 46.8 years). This difference was statistically significant (Fig. 1).

The cause of death was different between donors with tumor and donors without tumor. In 86% of donors with tumor the cause of death was a cerebral stroke, and only 64% of donors without tumor died of this cause. In 36% of donors without tumors the cause of death was a CE injury, and only 14% of donors with tumor died of this cause. The odds ratio was 3.3 (1.7–6.5) (Fig. 2). We have not found differences in the sex of donors with and without tumor.

The average age of the recipients transplanted with organs from donors with tumor was 47.9 (14.7) years. Sixty percent were men, and 40% were women. The organs transplanted were kidney in 64 (41%), livers in 65 (42%), hearts in 16, and lungs in 10 (10%) recipients.

Evolution was studied for 100 of the 155 recipients (65%) during follow-up. Twenty-two (22%) recipients died and 78 (78%) are alive. It is important to note that the death was cancer-related only in 7 of these 22 recipients (32%).

In our registry, in 17 of the 100 recipients followed-up, the transplant team did a prophylactic transplantectomy.

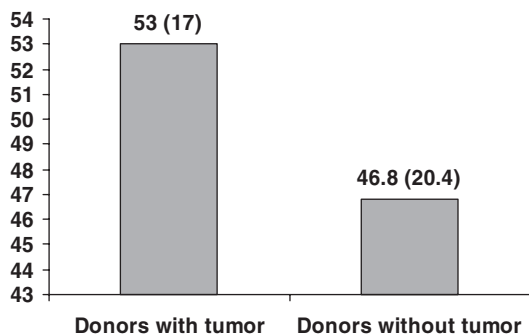


FIGURE 1. Age differences between donors with and without tumor ($P < 0.05$).

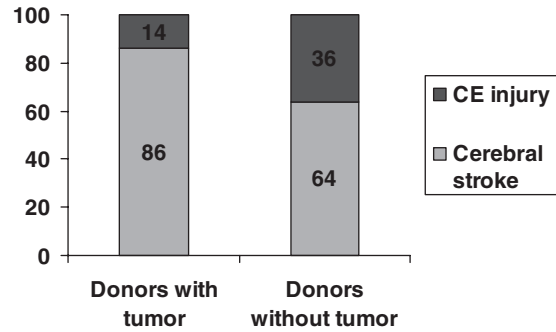


FIGURE 2. Cause of death differences between donors with and without tumor (%) (odds ratio, 3.3. (1.7–6.5), $P < 0.05$).

TABLE 1. Characteristics of donors

	Gender	Age	Cause of death	Tumor pathology
Case 1	Male	50	Cerebral stroke	Undifferentiated carcinoma
Case 2	Male	58	Cerebral stroke	Cancer of germinal cells
Case 3	Female	47	Cerebral stroke	Sarcoma
Case 4	Female	50	Cerebral stroke	Kidney carcinoma
Case 5	Male	39	Cerebral stroke	Kidney carcinoma

These 17 cases of transplantectomy were 2 lungs, 3 livers, and 12 kidneys; in 2 of these kidneys the transplantectomy was performed at the same time as the graft failure.

The graft evolution of 83 transplant organs was known. Twenty-seven of these (31%) had a graft failure; 6 hearts, 3 lungs, 12 livers, and 6 kidneys. It is important to point out that only five of these graft failures were cancer-related.

Only 13 of the 100 recipients followed-up developed a malignant tumor. But only 10 of these malignant tumors were donor-related. This figure supposes that only the 10% of the recipients transplanted with organs proceeding from donors with tumor have transmission. The transmission rates we have found are 6 per 10,000 related to the global recipients.

Table 1 shows the main characteristics of the donors with cancer transmission we have registered, and Table 2 shows the main characteristics of the recipients with tumor transmission.

DISCUSSION

We know that there is a risk of tumor transmission from a donor with a malignant neoplasia to the recipient. Some publications have shown this situation, but most of these cases have occurred at the beginning of the transplants (1–4). The shortage of organs for transplantation and the high number of patients who died on the waiting list for an organ are problems we have to bear in mind.

The transplant coordinators and transplant teams need some guidelines or rules for helping them to decide when an organ coming from a donor with a malignant tumor could be

TABLE 2. Characteristics of recipients

	Gender	Sex	Type of transplant	Donor	Transplantectomy	Evolution
Case 1	Male	38	Kidney	Case 1	No	Death
Case 2	Male	54	Kidney	Case 2	Yes	Death
Case 3	Male	31	Kidney	Case 3	No	Death
Case 4	Female	58	Kidney	Case 2	Yes	Alive
Case 5	Female	17	Kidney	Case 4	Yes	Alive
Case 6	Female	42	Kidney	Case 5	Yes	Alive
Case 7	Male	58	Liver	Case 1	No	Death
Case 8	Female	55	Liver	Case 2	No	Death
Case 9	Male	60	Liver	Case 3	No	Death
Case 10	Female	50	Lung	Case 3	No	Death

implanted with an acceptable risk. The document “Standardization of organ donor screening to prevent transmission of neoplastic diseases” (8) has been very useful for the selection of a donor with a tumor and for deciding when the organs coming from this donor could be implanted in a recipient.

It is important to register the data about the donors, and especially when the donor has a tumor or other problems (infections, infrequent diseases, so forth), a so-called marginal donor, because we could improve our knowledge about safety and quality when we accept this type of donor.

Our results showed that, when the transplant coordinators follow some adequate guidelines for the selection of a donor with a malignant tumor, the frequency of transmission is extremely low, but we cannot forget that the risk exists.

The profile of a donor who could have a tumor is an elderly person who has died of cerebral stroke. The tumors we found that could be transmitted to the recipients basically are tumors with a very high grade of malignancy (in our series, undifferentiated carcinoma, germinal cells carcinoma, and sarcoma); when one of these tumors is transmitted, the recipient prognosis is poor.

CONCLUSIONS

Although donors are always carefully evaluated, we cannot avoid cases in which recipients receive organs from donors with tumors. The registries of donors and recipients inform us about the frequency of donor malignancies and the

recipient evolution and help us to make decisions about donors and recipients.

In our experience, when the transplant coordinators follow some adequate guidelines for the selection of a donor with a malignant tumor, the risk of transmission from donors to recipients is really low and depends on the aggressiveness of the donor tumor.

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