

LETTER TO THE EDITOR

How can you be adherent if you don't know how?

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Dear Sirs,

Adherence to immunosuppressants is crucial for allograft survival in kidney transplant (KTx) patients [1]. Amongst others, lacking knowledge and misconceptions about immunosuppressants might lead to nonadherence and could be improved by education [2]. In our center, patients waiting for KTx visit the outpatient clinic at least once before and every 1–3 years after listing. During each visit, the importance of regular and correct immunosuppressant intake is discussed. Immediately after KTx, the same is explained on the ward and in structured lectures during rehabilitation which 2 of 3 of the patients attend. However, misconceptions about immunosuppressants are regularly revealed during follow-up visits. We wondered how much our patients knew about correct immunosuppressant handling. As part of a recent study on adherence [3], we therefore asked the patients to answer a self-developed questionnaire consisting of 8 multiple choice questions about basic and more specific details concerning immunosuppressant intake (Table 1).

Of 239 patients participating, 17 patients (7.1%) answered all questions and 190 (79.5%) more than 50% correctly. On average, 5.66 ± 1.40 questions (70.1%) were correctly answered. There were no significant correlations between test results and age, educational level, immunosuppressant blood level variability, depression and anxiety scores, self-reported adherence with immunosuppressants (for details, see [3]), and the frequency of appointments with a nephrologist. The percentage of correct answers was negatively correlated with time since transplantation (Pearson -0.176 , $P = 0.007$). Female patients had slightly but significantly

better results than male patients (5.94 ± 1.37 vs. 5.52 ± 1.40 , $P = 0.026$), and living donor recipients had better results than deceased donor recipients (6.13 ± 1.07 vs. 5.48 ± 1.47 , $P = 0.001$). Surprisingly, participation in a rehabilitation program did not lead to better results (5.73 ± 1.44 vs. 5.57 ± 1.34 , $P = 0.377$).

Our questionnaire might not meet the highest scientific standards, but our results give some interesting clues about health literacy in our KTx cohort. Overall, knowledge was disappointingly low, which is in line with the literature [4,5], and seemed to decrease with time since transplantation. The better test results in living donation recipients might be explained by a more intense preparation. Preparation time for living donation is relatively short (0.5–2 years), but patients see a transplant coordinator multiple times during that short time period. Most patients knew that grapefruit can influence immunosuppressant levels, but not that pomegranate potentially does the same, revealing another problem: pomegranate only came into focus recently [6], and patients usually do not receive structured education on new findings during follow-up. Furthermore, physicians and nurses themselves might lack knowledge and, therefore, might not be able to inform their patients properly [7].

Within the last years, we and other centers have begun to focus more on adherence in KTx patients, because of its importance for graft survival [1,8]. Our questionnaire is not sufficient to demonstrate an association between knowledge and adherence to immunosuppressants. However, it is obvious that even the most adherent patient cannot handle immunosuppressants correctly if he or she does not know how. We therefore strongly advocate providing structured information and education before KTx, shortly after, and on a regular basis during follow-up for all patients.

Conflicts of Interest

The authors declare no competing financial interests.

Table 1. Percent of patients answering each item on the immunosuppressant knowledge questionnaire (correct answers are highlighted). Multiple selections were allowed. In question 4, both answer 1 and answer 2 were considered to be correct, because both actions can be adequate depending on the time point the patient noticed that he or she forgot to take the medication (shortly after the regular time or several hours later).

Question	% of patients choosing the answer
1) Which of the following foods/beverages can influence your immunosuppressant blood levels?	
Kiwi	6.2%
Grapefruit	83%
Chocolate	5.8%
Coffee	5.8%
Pomegranate	12%
St. John's wort	36.9%
Banana	10.4%
Peppermint tea	1.7%
2) When are immunosuppressant blood levels measured?	
Before intake	88%
During intake	0.8%
After intake	8.3%
Independent of intake	5%
3) When should you take your immunosuppressants in relation to meals?	
1–2 h before meals	29%
Directly before meals	18.7%
During meals	21.6%
1–2 h after meals	33.6%
More than 2 h after meals	7.1%
4) Which action should be taken when you forgot to take one dosage of your immunosuppressant?	
Skip the dosage completely	88.4%
Quickly take the medication	89.6%
Take twice the dosage	1.2%
Measure blood level and decide afterward	12.0%
5) Which action should be taken if you—after having taken your immunosuppressant—experience diarrhea or vomiting during the day?	
Continue immunosuppressant intake as before	65.5%
Immediately take another dosage	3.7%
Take twice the dosage next time	0.8%
Measure blood level and decide afterward	38.2%
6) Diarrhea can significantly alter cyclosporin or tacrolimus blood levels:	
Yes	80.9%
No	19.1%
7) While traveling immunosuppressants have to be stored in the suitcase rather than carry-on-luggage in order to maintain a cooler temperature:	
Yes	19.1%
No	80.9%
8) Switching between immunosuppressants from different manufacturers (generics) is unproblematic:	
Yes	39.8%
No	60.2%

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