A relative survival model to compare the risk of mortality in kidney transplanted patients versus patients awaiting transplantation.

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INTRODUCTION

- In 1999, **Wolfe et al.** (*New England Journal of Medicine*) have compared the mortality in kidney transplanted patients versus patients awaiting a transplantation for the first time using an appropriate methodology (Survival Cox model). They showed that:
  - in the **short-term**, the risk of death was higher in transplanted patients
  - an inversion of the risk ratio at **106 post transplantation days**
  - in the **long-term**, the risk of death was higher in dialysis patients
- Main limitaion: the method did not allow to consider specific variables of the transplantation or the donor.

OBJECTIVE

- **To model the transplant recipients relative mortality compared to comparable patients remained under dialysis awaiting a transplantation.**
  - To identify **patients' risk profiles** compared to dialysis treatment.
  - To estimate the time of **post transplantation transition** from an excess to a decrease risk of mortality.

METHODS - Estimation of the expected risk of death in dialysis

Since no mortality database of dialysis patients was available, we needed to model the expected risk of death in this reference population

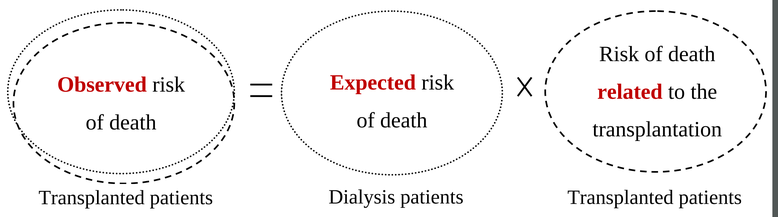
- A **competitive hazards model** was performed based on 9852 dialysis patients registered on waiting list from the French register REIN (Réseau Epidémiologie et Information en Néphrologie). During the follow-up:
  - 436 patients died
  - 7550 patients were transplanted

METHODS - Estimation of the risk of death related to the transplantation (1)

- Transplanted patients were selected from the French prospective DIVAT cohort (www.divat.fr/en):
  - Adult recipients at the time of waiting list registration
  - Transplanted for the first time from 1996
  - Centers: Nantes, Necker, Nancy, Montpellier, Toulouse and Lyon
  - Patients receiving a kidney transplant from a heart beatting deceased donor
  - Patients who began dialysis treatment from 1995
- 3941 transplanted patients included

METHODS - Estimation of the risk of death related to the transplantation (2)

- Development of a **multiplicative relative survival model**. *(Andersen et al., Biometrics, 1985)*
  - Assumption: To correct the **observed survival** in transplanted patients by the **expected survival** estimated from the reference population (dialysis patients).



  - The Expected risk of death was estimated from competitive hazards model results.

RESULTS

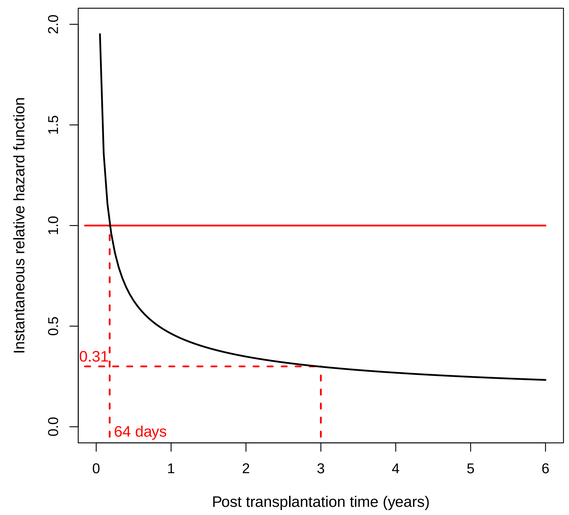


Figure : Instantaneous relative hazard according to post-transplantation time.

- **Post-transplantation period with an excess risk of death** equals to 64 days (on average), compared with similar dialysis patients on waiting list. *(Wolfe et al.: 106 days)*
- At 3 years post-transplantation: the **relative risk of death** was 3 times higher in dialysis (RR=0.31). *(Wolfe et al.: 0.32)*

RESULTS

- **7 variables had a different effect in each group** (Increase of the risk ratio associated with the death in transplanted patients compared to dialysis patients):
  - recipient age
  - body mass index
  - dialysis duration before waiting list registration
  - blood group
  - cardiac antecedents
  - anti HLA class I and class II immunization
- Adjustment on **3 risk factors specific of the transplanted population**:
  - donor age
  - cytomegalovirus donor serology
  - cold ischemia time

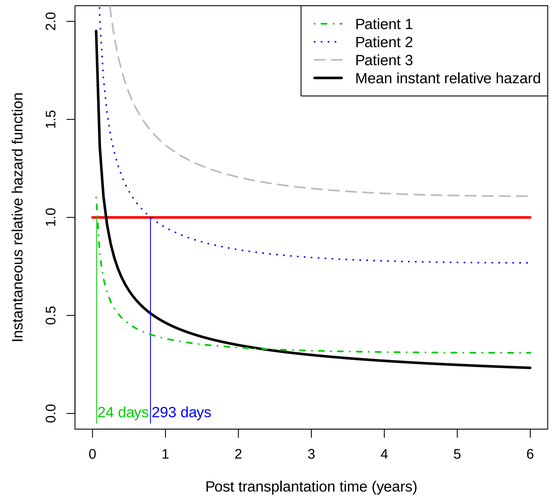


Figure : Examples of individual instantaneous relative hazard functions predicted according to post-transplantation time.

- **Model individual predictions**:
  - **Patient 1** (few risk factors) → Excess risk of death period of 24 days.
  - **Patient 2** (some risk factors) → Excess risk of death period of 293 days.
  - **Patient 3** (many risk factors) → No under risk of death period.

CONCLUSION

- Model which allows to **identify patients profiles** with a precocious/delayed transplantation benefit compared to dialysis.
- Useful information for **graft decision/allocation**.

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The authors declare no competing financial interests.