IMPACT OF REAL-TIME THERAPEUTIC DRUG MONITORING INTRODUCTION ON THE CARBEPENEM PRESCRIPTION AMONGST SEVERELY BURNED PATIENTS REQUIRING ICU ADMISSION

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Introduction

Antibiotic prescription is difficult in severely burned patients due to the extreme variability of drugs pharmacokinetics. Therapeutic Drug Monitoring (TDM) could be one way towards its optimization.

Methods

Retrospective analysis of imipenem/cilastin (IMIP) and meropenem (MERO) consumption (cumulative dose / number of burned patients / year) and daily dosage at an ICU burn center. All patients having received IMIP or MERO over the study period were included. Data were extracted from the computerized information system (Metavision®, IMD Soft) on all burned patients admitted from 2001 to 2011 to our burn center.

Objectives

Carbapenems are widely used for the treatment of severe nosocomial infections and for initial empirical therapy amongst burned patients.
Prior to June 2007, their TDM was only available on special requests and results were provided within 2 business days at our hospital (**period 1**). Since July 2007 (real-time TDM), carbapenem TDM is available within 6 h one day per week (**period 2a**) and since 2010, 4 days a week (**period 2b**).
We therefore asked whether this introduction impacted on carbapenem prescription amongst severely burned patients requiring ICU admission.

Results

Amongst the 366 burned patients admitted, 236 patients (63%) received antibiotics and 110 were prescribed carbapenems. Administration of IMIP increased from 1.6 g daily dose (period 1) to 1.8 g (period 2) (p = 0.01). In contrast, the steadily increase in MERO daily dose that peaked at 5.0 g/day in 2006 was followed by a decrease to 2.7 g in 2011 (**Figure 1)**. A correlation between the number of TDM requests and the daily dose was found (R = 0.7) (**Figure 2**).

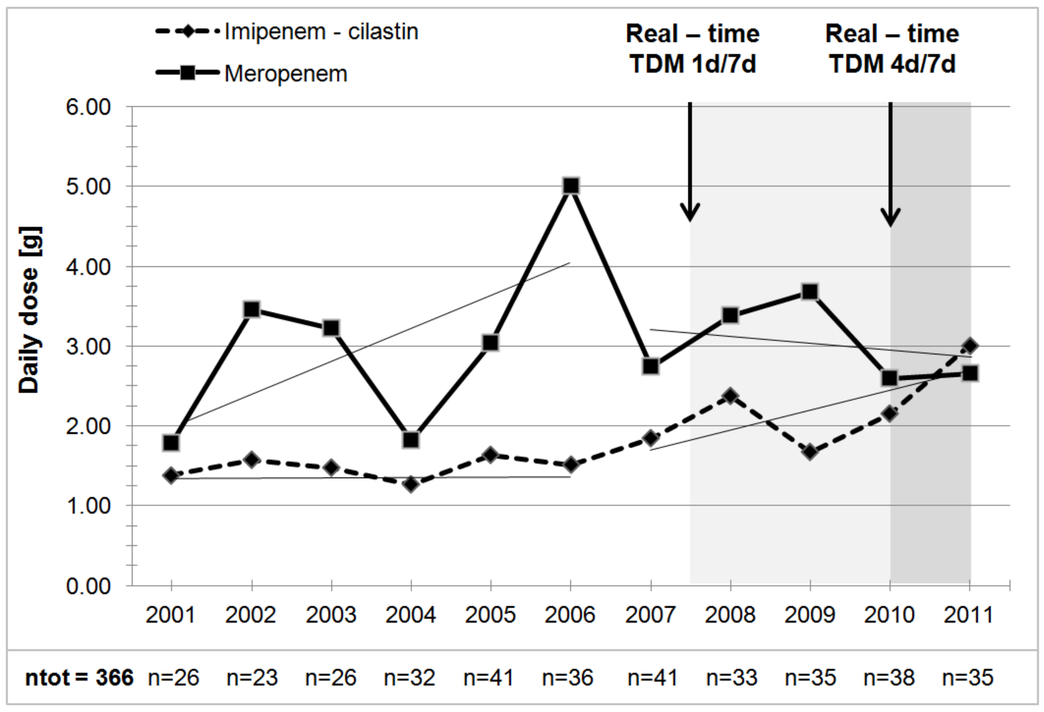

Figure 1. Daily doses of imipenem / cilastin and meropenem from 2001 to June 2007 (period 1), from July 2007 to Dec. 2009 (light grey, period 2a) and from Jan. 2010 to Dec. 2011 (dark grey, period 2b).

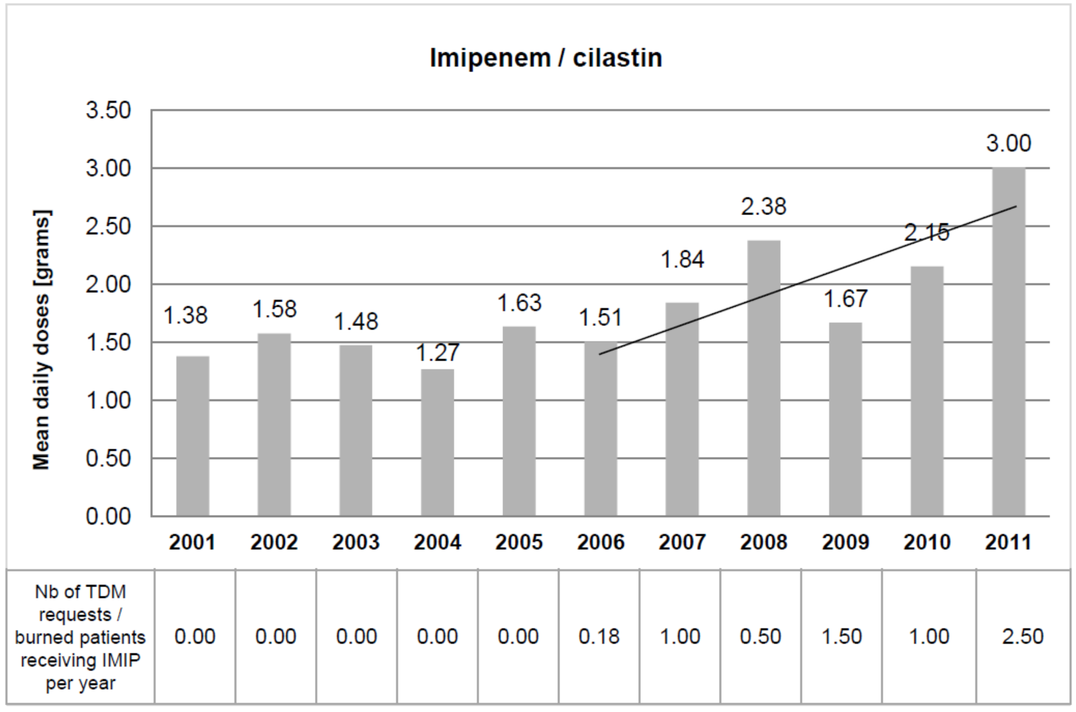

Figure 2. Correlation between numbers of TDM requests and daily doses of imipenem / cilastin

In parallel, we observed a reduction in the IMIP consumption at the Burn ICU from 10.3 cures/year (period 1) to 4.2 cures/year (period 2) (p = 0.04) and a sharp increase of the MERO consumption (from 4.4 cures/year (period 1) to 10.8 cures/year (period 2) (p = 0.02)).

Discussion - Conclusion

Our retrospective analysis of antibiotic use in severely burned patients suggests that real-time availability of TDM resulted in major alterations in carbapenem prescription.
The high daily doses of MERO empirically introduced since 2001 in symmetry with the doses administered to cystic fibrosis patients receiving lung transplant were not justified in severely burned patients. In contrast, the low daily doses of IMIP historically linked to the potential risk of seizures (**Figure 3** and **Figure 4**) at high dosage, were also inappropriate. This may have contributed to the progressive replacement of IMIP by MERO.
Further prospective studies are now required to determine if these changes will impact on treatment efficacy and safety.

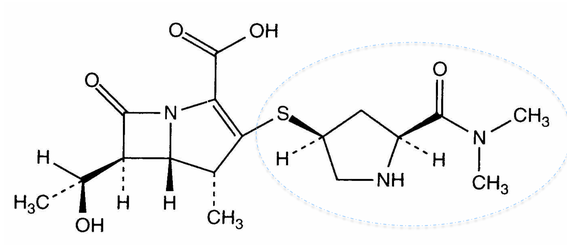

Figure 3.
Chemical structure of meropenem

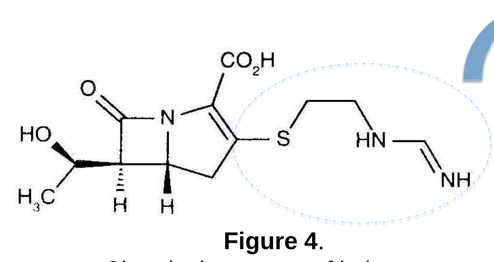

Figure 4.
Chemical structure of imipenem

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