

# 模擬分析靶控輸注Propofol應用於華人病患的準確度

## Simulation analysis of the performance of target-controlled infusion of propofol in Chinese patients

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### 摘要

背景：靶控輸注的準確度對病患的安全有重大的影響。本模擬研究是要檢驗應用兩組propofol藥物動力學參數於靶控輸注時的準確度。方法：利用Marsh與Schnider兩組propofol藥物動力學參數，與Li所發表的華人參數做比較。Li的propofol藥物動力學參數依照病患之體重與年紀有所不同，一般成人、肥胖成人、與老年人，以上三種不同的參數將用來評估比較Marsh與Schnider兩組參數用華人病患的準確度。首先利用Li參數製作出60位虛擬病人，STANPUMP程式將用於藥物動力學的模擬分析。一般成人與肥胖成人propofol的劑量是2mg/kg誘導，接著以靶控輸注4g/mL，時間120分鐘；老年人則是以1.5mg/kg誘導，接著以靶控輸注3g/mL，時間120分鐘。STANPUMP模擬出的輸注流速將輸入以Li的propofol參數為基準的60位虛擬病人。MDPE與MDAPE被計算出來，分別代表偏差度與不準確度。Marsh與Schnider兩組參數的偏差度與不準確度的差異，將用Ttest檢驗。結果：偏差度與不準確度在一般成人組，使用Marsh參數是-11.9%與18.5%，使用Schnider參數是-8.6% and 17.9%。在肥胖成人組的偏差度與不準確度，使用Marsh參數是6.3%與26.2%，使用Schnider參數是-6.6%與22.6%。在老年人組，使用Schnider參數的不準確度42.1%，明顯較Marsh參數的不準確度15.5%高。結論：除了Schnider參數應用於老年人外，靶控輸注propofol應用於華人病患的準確度是可以接受的。對於propofol藥物動力學在華人以及非華人老年病患的差異，進一步的研究是必需的。

### Abstract

Background: The performance of target-controlled infusion (TCI) devices is important for the safety of patients. This study examined the performance of two propofol pharmacokinetic parameter sets in Chinese patients by computer simulation. Methods: Two sets of propofol pharmacokinetic parameters respectively derived from Marsh's and

Schnider's studies were compared with those obtained in Chinese subjects from Li's study. Pharmacokinetic parameters of propofol from Li's study for subjects of three different entities (average adult, obese adult, and elderly) were used to estimate the performance of Marsh's and Schnider's models. Sixty virtual patients were generated with Li's parameters. A computer program, STANPUMP, was used to perform the pharmacokinetic simulation. An induction dose of propofol at 2 mg/kg for average or obese adult, while 1.5 mg/kg for the elderly, followed by TCI of 4  $\mu$ g/mL (average and obese adult) or 3  $\mu$ g/mL (elderly) were simulated. The infusion schemes generated by STANPUMP using Marsh's or Schnider's model were put in to simulate the predicted plasma concentration based on the pharmacokinetic parameters from Li's study. The median performance error (MDPE) and absolute median performance error (MDAPE) were calculated to estimate the bias and inaccuracy. Differences between models were calculated using the paired t test. A P value < 0.05 was considered statistically significant. Results: The bias and inaccuracy by Marsh's model in average adults were -11.9% and 18.5% respectively and by Schnider's model were -8.6% and 17.9%. For obese adults, the bias and inaccuracy were 6.3% and 26.2% respectively for Marsh's model and -6.6% and 22.6% for Schnider's model. Schnider's model resulted in a significantly greater inaccuracy than Marsh's model (42.1% versus 15.5%) when applied to elderly patients. Conclusions: The performance of TCI infusion of propofol in Chinese patients is generally acceptable with Marsh's or Schnider's model apart from using Schnider's model in Chinese elderly patients. Further study to investigate the difference of propofol pharmacokinetics between Chinese and non-Chinese elderly patients is necessary.