

차세대 정맥 내 약물주입법 : 목표농도 조절주입 Target Controlled Infusion

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Abstract

Target controlled infusion(TCI) is an infusion system which allows the anesthetist to select the target blood concentration required for a particular effect and then to control the depth of anaesthesia by adjusting the requested target concentration, which includes the instantaneous calculation of the infusion rate necessary to obtain and maintain a given therapeutic blood concentration of drug based on average pharmacokinetic parameters. We can apply this concept of infusion system not only to anesthetics but also to any kinds of intravenous drug infusion including antibiotics in the future.

Keywords : Target controlled infusion;

Target blood concentration

;

(infusor, infusion pump) 1 가
drop dropper
, 2 syringe ,
syringe pump , 3
syringe pump
가

(target controlled infusor) .
가 .
1, 2 Infusion pump
가 가
(target controlled
infusion, TCI)
. TCI
(pharmaco-
kinetic model)

TCI

1. TCI

pharmacokinetic model 1968
1980 computer - controlled infusion pump가
infusion pump hardware software
infusion pump pharma-
cokinetic model microprocessor(computer)

- 1) CATIA(computer assisted total intravenous anesthesia)
 - 2) TIAC(titration of intravenous agents by computer)
 - 3) CACI(computer assisted continuous infusion)
 - 4) CCIP(computer controlled infusion pump)
- TCI가

TCI pump
microprocessor mg/kg/hr

2. TCI system

- 1) Pharmacokinetics - parameters

- 2) algorithms
- 3) Control unit 1) 2) software micro-processors
- 4) Control unit infusion pump communication systems
- 5) user interface

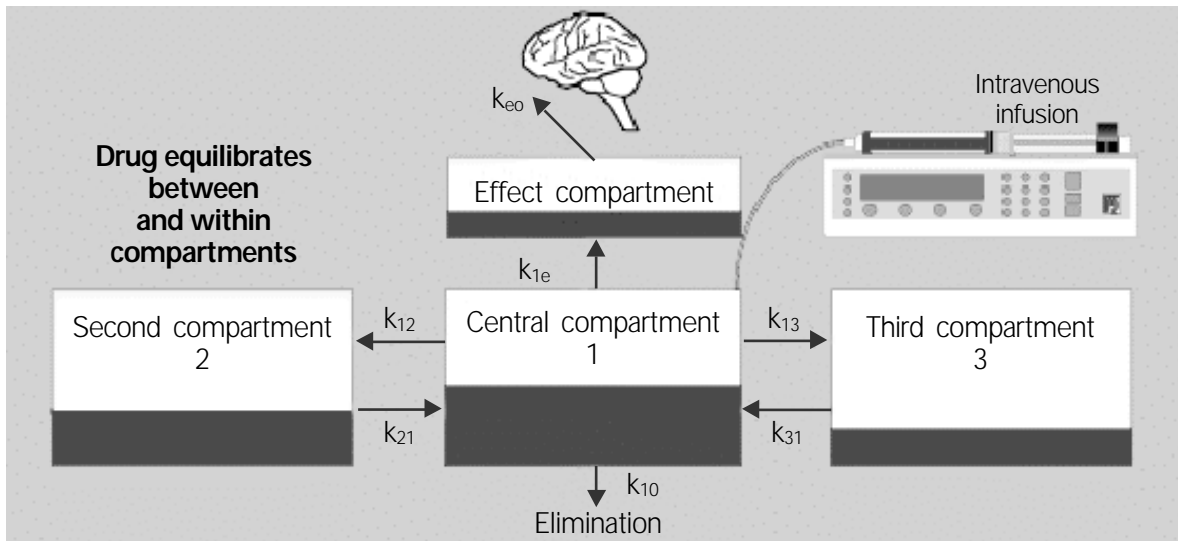
3. TCI

4. TCI

- 1)

- 2)

parameter



1. Open, three - compartment model : schematic representation

3)

Data

가 가 .

- 1) Diprifusor TCI : Glasgow Univ.(GNC Kenny)
- 2) CACI(computer assisted continuous infusion, Duke univ. USA)
- 3) STANPUMP(S. Shafer, Stanford univ. USA)
- 4) J Schuttler(Bonn, Germany)
- 5) RM Tackley(Bristol, UK)
- 6) FHM Engbers(Leiden, Holland)

5. Propofol TCI system

Propofol(Diprivan) 1986

가

가 ,

. Diprifusor

TCI system syringe pump

. Glasgow

TCI propofol

type system

macokinetic parameter

TCI propofol

prototype system

가

6. Propofol

TCI

. TCI

. Propofol

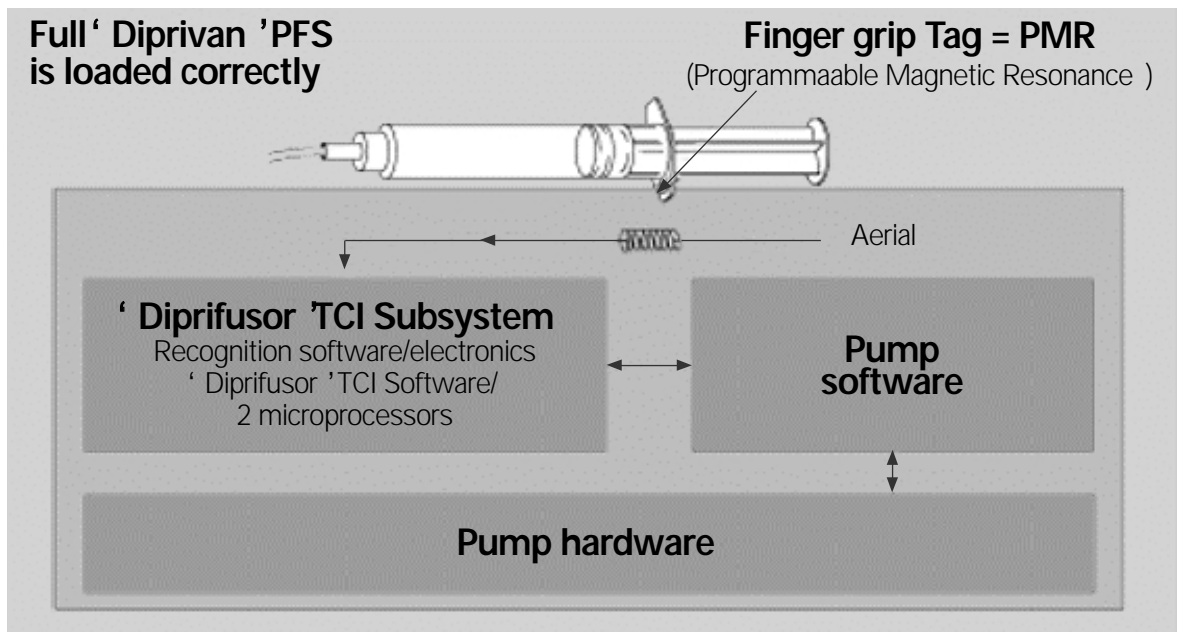
proto- (distribution) metabolic clearance .

phar- Bolus dose propofol 가

distribution phase

(redistribution) .

clear-



2. Diprifusor TCI system

1. Diprifusor software	pharmacokinetic parameters
V_1 (Volume of central compartment)	228 ml/kg
K_{10} (Elimination rate constant)	0.119/min
K_{12} (Intercompartmental distribution rate constant)	0.114/min
K_{21}	0.055/min
K_{13}	0.0419/min
K_{31}	0.0033/min

ance (1). Bolus dose
open - three compartment model
Diprifusor - TCI
pharmacokinetic
parameter
distribution elimination
pharmacokinetic parameter가
computer simulation

"Marsh model" 가 가
Diprifusor - TCI model (1).

7. Diprifusor TCI

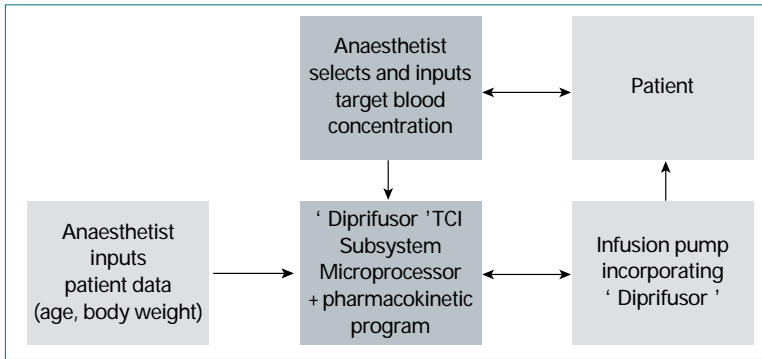
1) Propofol(diprivan) pre - filled syringe(PFS)
TCI propofol PFS

ZENECA

PFS set PFS, finger grip(recognition tag가
plastic plunger rod, luer connector .

2) Finger Grip Recognition Tag
(Electronic marker)

finger grip 가 slot
PFS가



3. Main components of a Diprifusor TCI system

(1) Fail - safe mechanism

algorithms
model
pharmacokinetic
algorithm
microprocessor
microprocessor
output
micro-processor

, tag (magnetic resonance microprocessor 가 20%
signals)가 syringe pump aerial(10 error message가
) Diprifusor
TCI subsystem (2). Diprifusor fusor
TCI subsystem electronics software 가 5%
syringe pump tagged propofol PFS가
Diprifusor TCI mode Di- (2) Installation specification
prifusor TCI software propofol PFS가 1% Diprifusor TCI
2% . Diprifusor TCI Dipri- 5% . (IVO
van 1% 2% 5358) 20%
propofol PFS (propofol)
recognition tag (3) Software

3) Diprifusor TCI software

Glasgow Diprivan
pharmacokinetic parameter가
three - compartment pharmacokinetic model
infusion control algorithms가

(3).

- : 16 100
 - : 30 150 kg
 - : 0.1 15 µg/ml
- Diprifusor TCI
가

8. Diprifusor - TCI

1) Diprifusor

Diprifusor - TCI

median performance error(MDPE) median absolute performance error(MDAPE) . MDAPE

TCI 20~40%
MDPE 10~20% . Diprifusor PCI
Diprifusor TCI
20~30% (pharmacokinetic variability)

TCI
TCI

Diprifusor TCI가 16% isoflurane
1 가
20% Diprifusor TCI

20~30%

2) Diprifusor TCI

Russel

Diprifusor TCI

8

Diprifusor TCI

6 Diprifusor

TCI가 manual control

7

Diprifusor TCI

Diprifusor TCI

Diprifusor
TCI , Diprifusor TCI
Diprifusor TCI

가 , Diprifusor TCI manual control 가

9. Stelpump Software

TCI 가
notebook computer download
infusion pump serial ports TCI
가 가 software가

Stelpump software(JF Coetzee, Department of Anesthesiology, Faculty of Medicine, University of Stellenbosch, Tygerberg, South Africa)
parameter , pharmacokinetic model

가

software

Diprifusor TCI

가 가 .



TCI

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