



# Set of slides for the Factsheet Anesthesia

## **Sex and gender differences in anesthesia and perioperative medicine**

Author(s): Prof. Dr. med. Martin Schläpfer

Institutes of Anesthesiology and Physiology

University Hospital and University of Zurich





# Propofol

Most common hypnotic for anesthesia induction and anesthesia maintenance



# Propofol - Shorter emergence time in women

Clinical Science | May 1999

## Women Emerge from General Anesthesia with Propofol/Alfentanil/Nitrous Oxide Faster than Men FREE

Tong J. Gan, MB, FRCA, FFARCSI; Peter S. Glass, MB, FFA(SA); Jeff Sigl, PhD; Peter Sebel, MB, BS, PhD, FFARCSI; Fredrick Payne, MD; Carl Rosow, MD, PhD; Patricia Embree, CRNA

[+ Author and Article Information](#)

Anesthesiology May 1999, Vol. 90, 1283-1287.

Table 2. Bispectral Index (BIS) Data and Recovery Parameters

	Male (n = 96)	Female (n = 178)	P Value
Intraoperative average BIS*	47 ± 9	47 ± 8	0.84
Prerecovery average BIS†	51 ± 10	53 ± 12	0.22
Time interval: propofol off to open eyes (min)	11.2 ± 8.6	7.0 ± 5.2	0.0001
	9.0 (20.8)‡	6.4 (13.1)‡	0.0001§
Time interval: propofol off to responds to verbal command (min)	11.7 ± 8.6	8.1 ± 6.2	0.001
	9.4 (22.0)‡	7.0 (14.6)‡	0.001§

Data are mean ± SD.

\* Intraoperative average BIS = average value from start of procedure to 15 min before discontinuation of propofol.

† Prerecovery average BIS = average BIS value over 15 min before discontinuation of propofol.

‡ Median (90th percentile).

§ Statistical results from the Mann Whitney test.

## Propofol – faster degradation in women

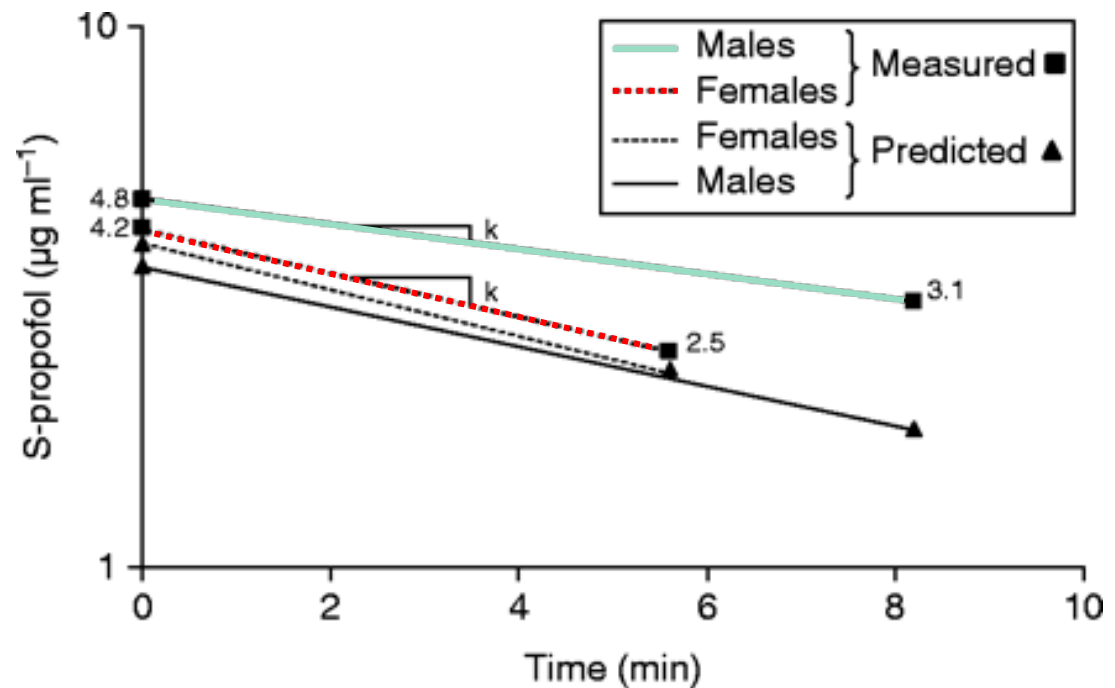
### Why do women wake up faster than men from propofol anaesthesia? <sup>FREE</sup>

S. C. Hoymork ✉, J. Raeder

*BJA: British Journal of Anaesthesia*, Volume 95, Issue 5, November 2005, Pages 627–633,

<https://doi.org/10.1093/bja/aei245>

Published: 16 September 2005 [Article history](#) ▾





## Postoperative morphine application

Morphine is the most common opioid used in the postoperative phase.



# Postoperative Morphine – self-administered doses using patient controlled analgesia are lower in clinical differences in humans

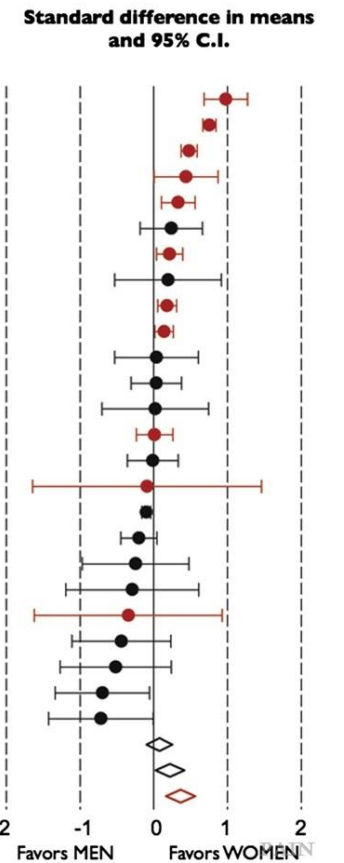
## Do sex differences exist in opioid analgesia? A systematic review and meta-analysis of human experimental and clinical studies

Niesters, Marieke<sup>a</sup>; Dahan, Albert<sup>a,c</sup>; Kest, Benjamin<sup>b,c</sup>; Zacny, James<sup>d</sup>; Stijnen, Theo<sup>e</sup>; Aarts, Leon<sup>a</sup>; Sarton, Elise<sup>a</sup>

[Author Information](#)

Pain: October 2010 - Volume 151 - Issue 1 - p 61-68  
doi: 10.1016/j.pain.2010.06.012

Clinical studies on $\mu$ -opioids						
Study	Std diff in means	SE	P-value	Relative weight (%)	MEN (n)	WOMEN (n)
[24] de Kock 1991	0.977	0.150	0.000	4.90	111	89
[17] Chia 2002	0.754	0.045	0.000	5.63	854	1444
[16] Chang 2006	0.478	0.056	0.000	5.58	646	662
[9] Burns 1989	0.438	0.222	0.048	4.20	38	46
[63] Sidebotham 1997	0.331	0.116	0.004	5.20	158	142
[14] Chang 2006	0.238	0.217	0.272	4.26	33	61
[43] Joels 2003	0.213	0.091	0.020	5.38	235	246
[5] Bijur 2008c	0.194	0.369	0.600	2.87	13	17
[49] Macintyre 1995	0.180	0.065	0.006	5.54	486	453
[65] Tsui 1996	0.141	0.063	0.025	5.55	494	510
[51] Miller 2004	0.036	0.286	0.899	3.58	24	25
[7] Birnbaum 2007	0.034	0.175	0.845	4.67	82	54
[5] Bijur 2008a	0.020	0.368	0.958	2.87	17	13
[38] Glasson 2002	0.010	0.126	0.938	5.12	115	137
[12] Cepeda 2003	-0.013	0.208	0.952	4.34	30	99
[4] Bennett 1982	-0.091	0.791	0.909	1.03	2	8
[1] Aubrun 2005	-0.102	0.031	0.001	5.67	2344	1933
[30] Fukuda 2009	-0.202	0.126	0.108	5.12	97	183
[40] Gourlay 1988	-0.246	0.370	0.507	2.86	13	17
[64] Tamsen 1982	-0.292	0.459	0.524	2.25	12	8
[22] Dahlstrom 1982	-0.344	0.650	0.597	1.40	6	4
[6] Bijur 2006	-0.439	0.343	0.201	3.07	16	19
[5] Bijur 2008b	-0.516	0.385	0.180	2.75	11	19
[46] Lehmann 1988	-0.696	0.326	0.033	3.22	21	19
[45] Larjani 2004	-0.716	0.361	0.047	2.93	12	25
<b>ALL STUDIES</b>	<b>0.094</b>	<b>0.089</b>	<b>0.286</b>			
<b>ALL PCA STUDIES</b>	<b>0.219</b>	<b>0.100</b>	<b>0.028</b>			
<b>PCA MORPHINE STUDIES</b>	<b>0.364</b>	<b>0.102</b>	<b>0.003</b>			



# ... but pain control with morphine appears to be more complex...



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Invited Review

## Sex differences in the response to opioids for pain relief: A systematic review and meta-analysis

Claudia Pisanu<sup>a</sup>, Flavia Franconi<sup>b</sup>, Gian Luigi Gessa<sup>a</sup>, Sergio Mameli<sup>c</sup>, Giovanni Maria Pisanu<sup>c</sup>, Iliaria Campesi<sup>d</sup>, Lorenzo Leggio<sup>e,f,g,1</sup>, Roberta Agabio<sup>a,\*,1</sup>

Results		
<b>Acute pain: Response after 30'</b>	♀ = ♂	Participants 563 Comparisons 13 Evidence quality ⊕⊕⊕ Moderate
<b>Acute pain: Self-administered dose in 24 hrs</b>	♀ < ♂	Participants 3,598 Comparisons 11 Evidence quality ⊕⊕⊕ Moderate
<b>Chronic cancer pain: Daily dose</b>	♀ = ♂	Participants 708 Comparisons 6 Evidence quality ⊕ Very low
<b>Chronic non-cancer pain: Daily dose</b>	♀ < ♂	Participants 1,952 Comparisons 10 Evidence quality ⊕⊕ Low



## Postoperative nausea and vomiting (PONV)

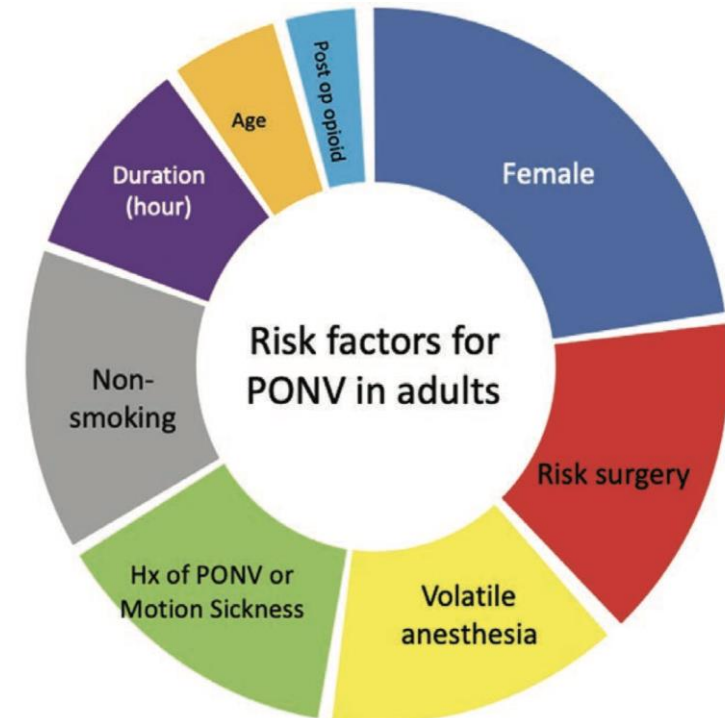
One of the most common problems of general anesthesia. The most undesired complication according to surveys among postoperative patients.



## The most common complication after general anesthesia: postoperative nausea and vomiting (PONV)

The most important risk factor for the occurrence  
PONV is «female sex».

Gan TJ et al. Anesthesia & Analgesia 2020



**Figure 1.** PONV risk factor summary. Intraoperative and postoperative risk factors of PONV in adults; the size of each segment is proportional to the odds ratios of PONV associated with each risk factor.<sup>35</sup> PONV indicates postoperative nausea and vomiting. Figure reused with permission from the American Society for Enhanced Recovery. For permission requests, contact [info@aserhq.org](mailto:info@aserhq.org).