



Consciousness Monitoring and New Technology

***GHSATT
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Objectives

1

Describe the basic technology of Bispectral Index (BIS™) monitoring

2

Discuss key applications and benefits of integrating BIS monitoring into anesthesia management

3

Discuss tips and guidelines of the technology. Describe the role of the Anesthesia technician

4

Questions and Answers



Bispectral Index (BIS) Technology and Brain Monitoring



BIS Adoption in the U.S.

Worldwide installed base¹	41,515
% of ORs in US hospitals	66%
% of "best" US hospitals	80%
-US	24,787
-International	16,728
Worldwide patients monitored to date	27 Million
Number of Studies on BIS	+3,000



Bispectral Index (BIS)

A practical, processed EEG parameter that measures the direct effects of anesthetics and sedatives on the brain

Provides objective information about an individual patient's response to anesthesia

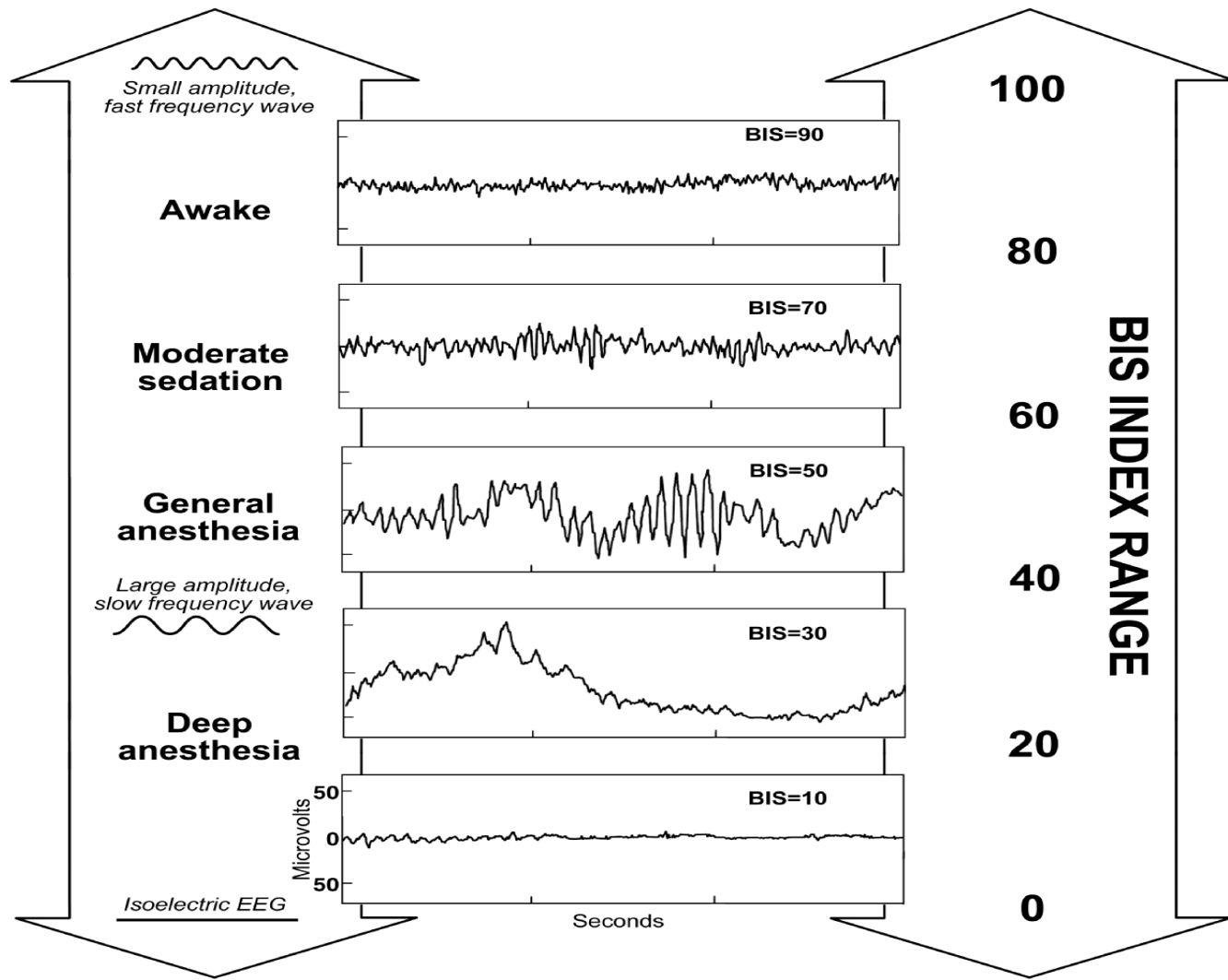
Numerical scale correlates to hypnotic endpoints

Extensive clinical validation

Easy to apply forehead sensor



EEG Response to Anesthetics





Monitoring Anesthetic Endpoints

BIS Monitoring

Consciousness/Hypnosis

**Balanced
Anesthesia**

Analgesia

Areflexia

***Hemodynamic
Monitoring***

***Peripheral
Nerve Stimulator
Monitoring***



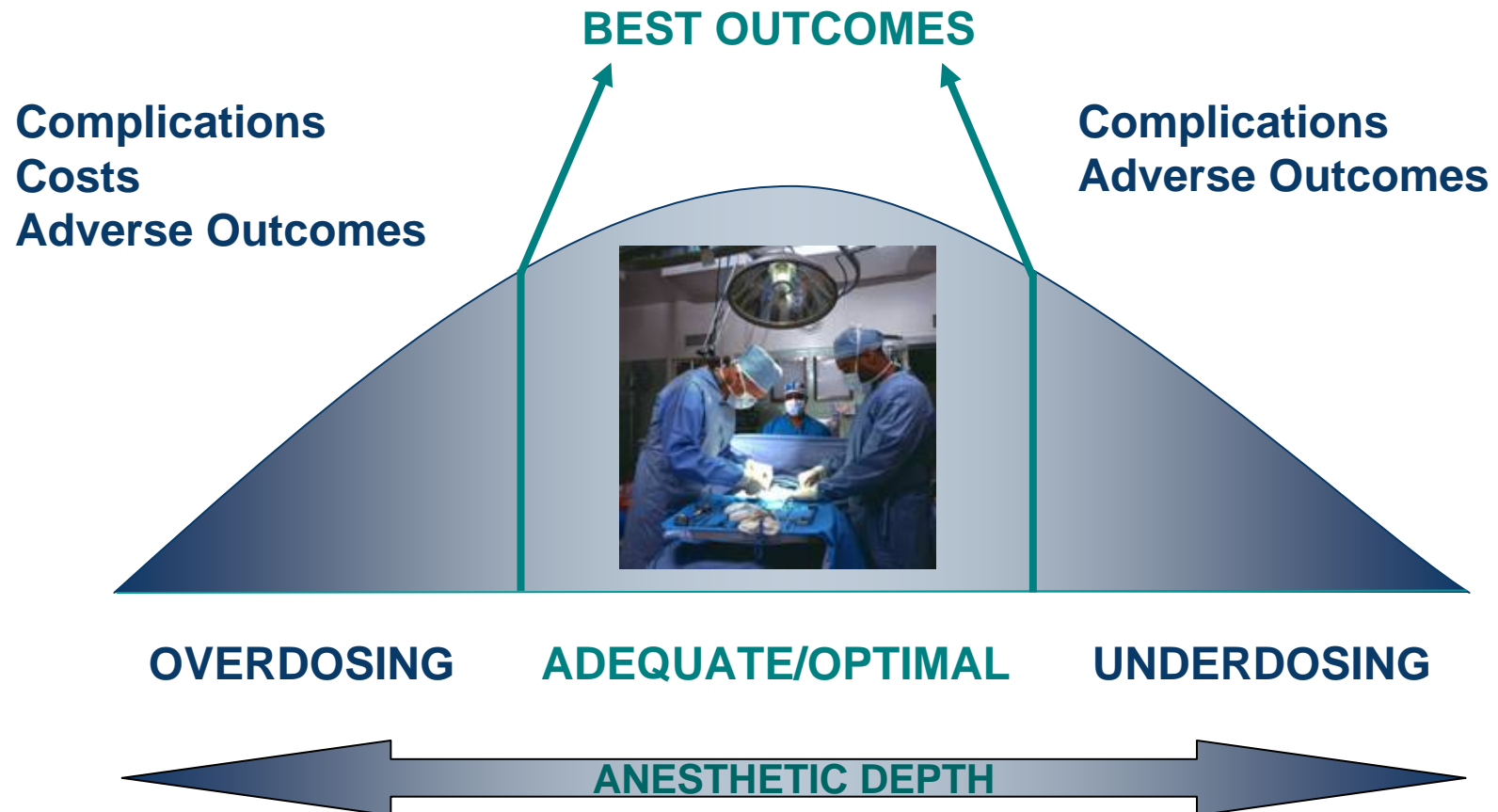


Applications and Indications of Consciousness Monitoring



Why Monitor Consciousness?

Anesthetic Effect Management

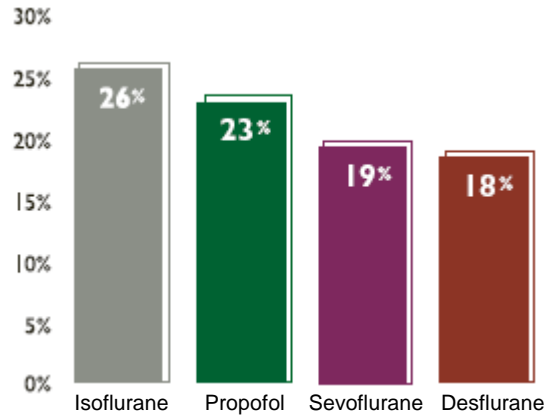




Documented Anesthesia Benefits Summary

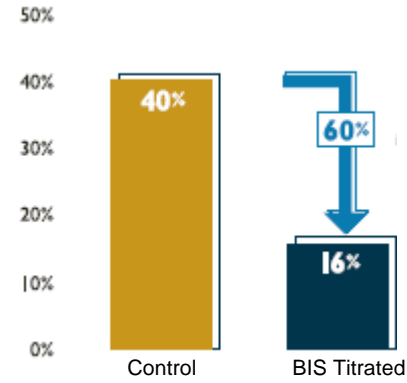
Drug Savings

(Gan, 1997; Bannister, 2001; Wong 2002; White 2004; Liu ,2004)



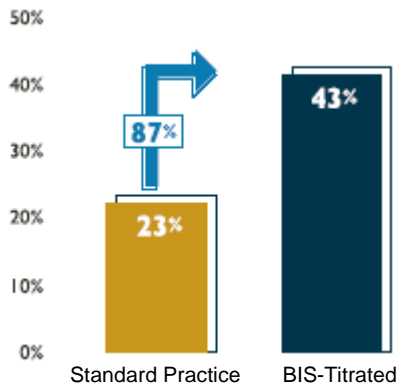
Decreased PONV

(Nelskya, 2001; Luginbühl, 2003)



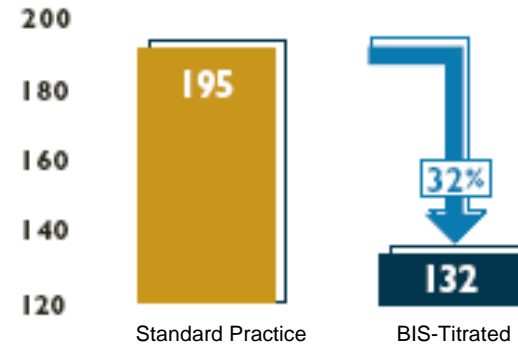
Faster Wake-Ups

(Gan, 1997)



Shorter PACU Stays

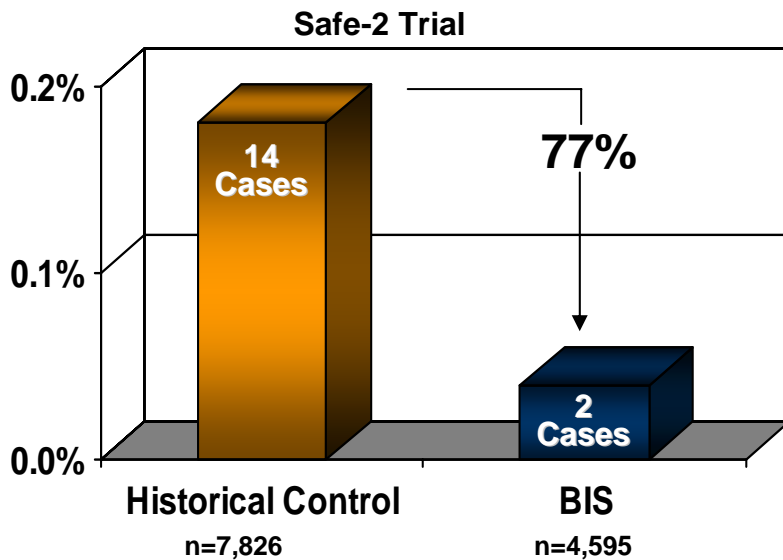
(White, 2004)



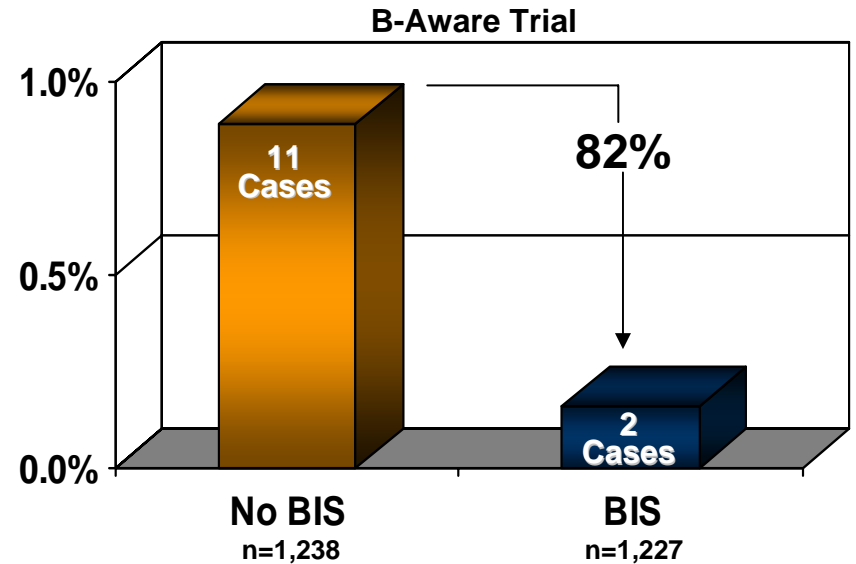


Patient Safety Benefits: Awareness

Reduction in incidence of awareness¹
(general patient population $p < 0.05$)



Reduction in incidence of awareness²
(high risk patients $p = 0.02$)



"The present incidence of awareness is the lowest ever reported in a reasonably large study using muscle relaxants."

"suggesting that greater use of BIS monitoring is warranted in patients at increased risk of awareness under-going relaxant general anaesthesia."

¹Ekman A, Et al. Reduction in the Incidence of Awareness Using BIS Monitoring. Acta Anaesthesiologica Scandinavica 2004; 48 (1): 20-6.

²Myles PS, Et. al. Bispectral Index Monitoring to Prevent Awareness During Anaesthesia: The B-Aware Randomised Controlled Trial. The Lancet 2004; 363: 1757-63.



BIS Reduces Intraoperative Awareness

- Class 1 evidence
- BIS reduces intraoperative awareness by 80% (FDA)
- Awareness Prevention Guarantee



JACHO's & ASA Awareness Prevention

- Intraoperative awareness happens 1-2 times per 1,000 cases. Approximately 20,000 patients per year.
- JACHO released a “Sentinel Event Alert” to have hospitals create a plan to reduce the probability of intraoperative awareness
- ASA implemented a “Practice Advisory”



Clinical Applications

Patient

- **Elderly**
- Medically-compromised
- Labile
- “At Risk”
- Pediatric
- **Trauma**
- **Obese**
- Organ dysfunction
- **History of Awareness**
- **IV Drug Users and Alcoholics**

Procedure

- Outpatient procedures
- **Prolonged surgery**
- **Cardiac surgery**
- **Neurosurgery**
- Procedures complicated by awareness risk (cardiac, trauma, obstetric)
- Remote/Office procedures
- **Emergency C-sections**

Technique

- **Neuromuscular blocking drugs**
- **Sedation management & MAC**
- **TIVA cases**
- Combined regional-general
- Nitrous-narcotic anesthesia
- Adjuvant therapies
- Hypotensive anesthesia
- Closed loop anesthesia



Summary

- **BIS measures the hypnotic effects of anesthetics and sedatives on the brain**
- **Sound scientific evidence has demonstrated the impact of BIS-guided anesthesia care:**
 - **Drug use**
 - **Speed and quality of recovery**
 - **Safety**
- **BIS can facilitate decision-making and patient management**



Monitoring Options and Information



Modules vs. Stand Alone Monitors

Modules: Integrated into your monitors

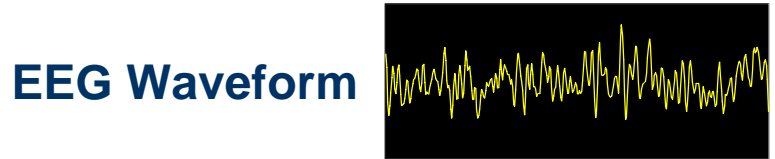
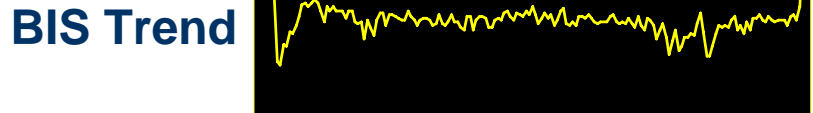
Stand Alone BIS Monitors





BIS Display Information

BIS Value **BIS**
50



SR (suppression ratio) **SR**
0



Applications and Guidelines



Bispectral Index (BIS) Sensors



Sensor Application



Apply sensor on forehead at angle

Circle #1: Centered, 2 inches above nose

Circle #4: Above & parallel to eyebrow

Circle #3: On temple area between corner of eye and hairline



Press around the edges of each circle to assure adhesion



Press each circle for 5 seconds

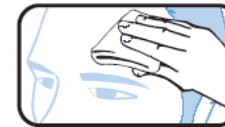
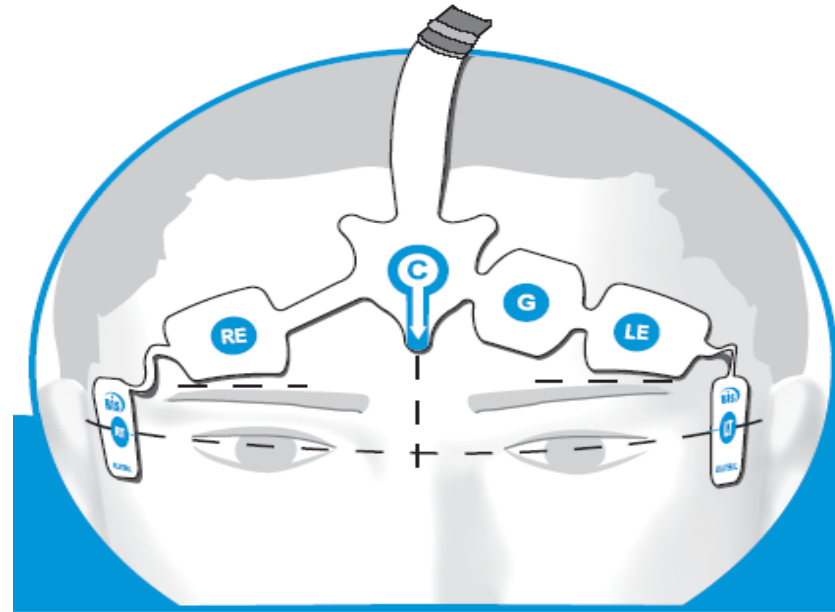


***Before placing sensor, wipe skin with alcohol and dry**



Bilateral Sensor Application

- Same peel-and-stick simplicity
- Designed for symmetrical placement to capture bi-hemispheric data
- Letter indicators for electrode positions
- Liner card with break away tab sections
- You can only use the Bilateral sensor with a BIS VISTA monitor with 3.0 and BISx4; it will not be recognized by BISx



1 Wipe skin with alcohol and dry



2 Detach breakaway sections on liner card for ease of handling



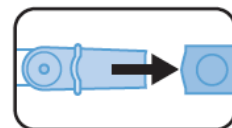
3 Position sensor on the forehead as follows:



4 Press edges of sensor to assure adhesion



5 Press **LE G G RE** and **RT** firmly for 5 seconds



6 Insert sensor tab into Patient interface cable



Role of the Anesthesia Technicians



Role of the Anesthesia Tech

- Every hospital is different
- Place the sensors on patients
- Supply monitors and sensors for cases
- Troubleshoot problems
- You will be the BIS experts!



Troubleshooting

Assess the problem

1. PIC Cable Problems

- “Reprep Sensor” probe **2** (Ground)
- Intermittent problems
- Use Sensor Simulator

2. Sensor Misplacement or Patient issues

- Seal edges before pressing numbers
- Patient with dry or dirty skin



Questions / Next Steps