



Sleep in Newborns

莊小玲

中山醫學大學護理系 助理教授

新生兒睡眠

- ▶ 睡眠的功能
- ▶ 睡眠發展
- ▶ 睡眠影響因素
- ▶ 睡眠評估
- ▶ 促進新生兒睡眠

睡眠的功能

- ▶ 腦功能活動的一種重新組合狀態
- ▶ 強化免疫系統
 - ▶ 釋放泌乳素 (prolactin) 、生長激素 (growth hormone) 和褪黑激素 (melatonin) ,促進免疫細胞的生長與分化
 - ▶ T細胞的數量在入睡後3小時內會開始減少
- ▶ 增強記憶力
 - ▶ SWS(NREM)有助於陳述性記憶鞏固:情節記憶、語意記憶; 將白天所學知識整合並儲存
 - ▶ REM有助於程序記憶鞏固的作用:技術及身體活動的記憶
- ▶ 調節體內內分泌
 - ▶ 生長激素在兒童夜間入睡後的10 點至凌晨 2 點為大量分泌時間 , 其釋出的生長激素較非睡眠時期高出三倍以上 , 尤其是在睡眠週期中的SWS時段達到高峰

睡眠不足的影響

▶ 生理

- ▶ 使身體處於輕度發炎的狀態下
- ▶ 心血管疾病與糖尿病
- ▶ 肥胖

▶ 認知

- ▶ 認知功能缺失-高層次的認知功能
- ▶ 問題行為
- ▶ 情緒困擾

▶ 動作

- ▶ 降低動作的速度、減少精確度

睡眠發展

- ▶ 時間
- ▶ 睡眠狀態
- ▶ 晝夜節律
- ▶ 睡眠固化

睡眠時間

- Premature Neonates
 - 90% ↑
- Full-term infant
 - 70%

年 齡	睡眠時間(小時)
出生1個月內	16 ~ 20
1 ~ 3個月	14 ~ 16
3 ~ 6個月	12 ~ 13
6 ~ 12個月	10 ~ 12

睡眠狀態 (Sleep States)

- ▶ Quiet sleep (QS)
 - ▶ Closed eyes, no eye movements, decreased body movements, slow waves on EEG, and regular respiration.
- ▶ Active sleep (AS)
 - ▶ Rapid eye movement (REM) ; closed eyes, eye movements, body and limb movements, low voltage EEGs, and irregular respirations
- ▶ Indeterminate or transitional sleep (IS)
- ▶ Waking
 - ▶ Open eyes, irregular and active respirations, as well as eye and body movements.

睡眠狀態的功能

▶ 安靜睡眠(Quiet sleep ; QS)

- ▶ 儲存能量、促進細胞的修復、鞏固神經傳導路徑及促進神經突觸的可塑性

▶ 活動睡眠(Active sleep ; AS)

- ▶ 神經傳導路徑的分化及成熟
- ▶ 感覺系統發育(視覺、聽覺、觸覺、本體覺)
- ▶ 發展學習能力
- ▶ 長期記憶

▶ 不明確睡眠(Indeterminate or transitional sleep ; IS)

睡眠狀態 (Sleep States)

- ▶ Fetuses

- ▶ 20-28 weeks

- ▶ Premature Neonates

- ▶ 25-27 weeks

睡眠/活動

STATE	Particular state
睡眠	規律睡眠(QS/NREM)
	不規律睡眠(AS/REM)
清醒/活動	昏睡(drowsiness)(IS)
	警覺不活動(alert inactivity)
	清醒兼活動(waking activity)
	啼哭(crying state)

Peter Wolff, 1959

睡眠/活動(Sleep States)

▶ 規律睡眠

- ▶ 呼吸平穩均勻，動作少，無眼球快速活動(NREM)，對外界刺激反應遲鈍
- ▶ 佔35~45%，每週期約持續10~20分鐘

▶ 不規律睡眠(irregular sleep)

- ▶ REM時間隨成長逐漸縮短，呼吸不均勻，對外界刺激出現驚嚇反射動作，眼球快速活動(REM)
- ▶ 佔45~50%，每週期約持續20~45分鐘

▶ 昏睡(drowsiness)

- ▶ 呼吸不規則，眼睛為半閉合，少有身體活動及面部表情，若有強烈的外在刺激則可能被喚醒

▶ 警覺不活動(alert inactivity)

- ▶ 可與人互動，眼睛張開，眼神明亮，對外在刺激可做出適當的回應

▶ 清醒兼活動(waking activity)

- ▶ 雙眼張開，四肢活動度大，對內或外在刺激會有強烈反應或出現驚嚇反射

▶ 啼哭(crying state)

- ▶ 有強烈而生氣的哭泣行為，四肢擺動不協調

晝夜節律 (Circadian rhythm)

- ▶ 生物時鐘
- ▶ 讓身體的生理狀態能適應一天之內
的起伏
- ▶ 約24.3小時
- ▶ 外界光線(視交叉上核)、身體活動
以及進食訊息

Circadian rhythm - Newborn

▶ Natural lighting

- ▶ Brighter during the day, darker during the night--adapted to the 24-hour cycle more quickly than those exposed to constant, low levels of light (Rivkees et al 2004).

▶ Sunlight

- ▶ Exposed to more sunlight during the afternoon tended to sleep better at night (Harrison 2004).

▶ *Outdoors Time*

- ▶ Babies who go outside experience much higher light levels than those kept indoors all day, and may develop stronger circadian rhythms as a result (Tsai et al 2012).

睡眠循環 (Sleep cycle)



睡眠循環 (Sleep cycle)

- ▶ AS --> QS
- ▶ 前半夜以QS為主，後半夜以AS為主
- ▶ > 35weeks
 - ▶ 45-60 分鐘

睡眠固化 (consolidation)



Sleep periods

1~4 hours (2nd week)

7 hours (5 month)



**Daytime cycles
become shorter than
nighttime cycles**

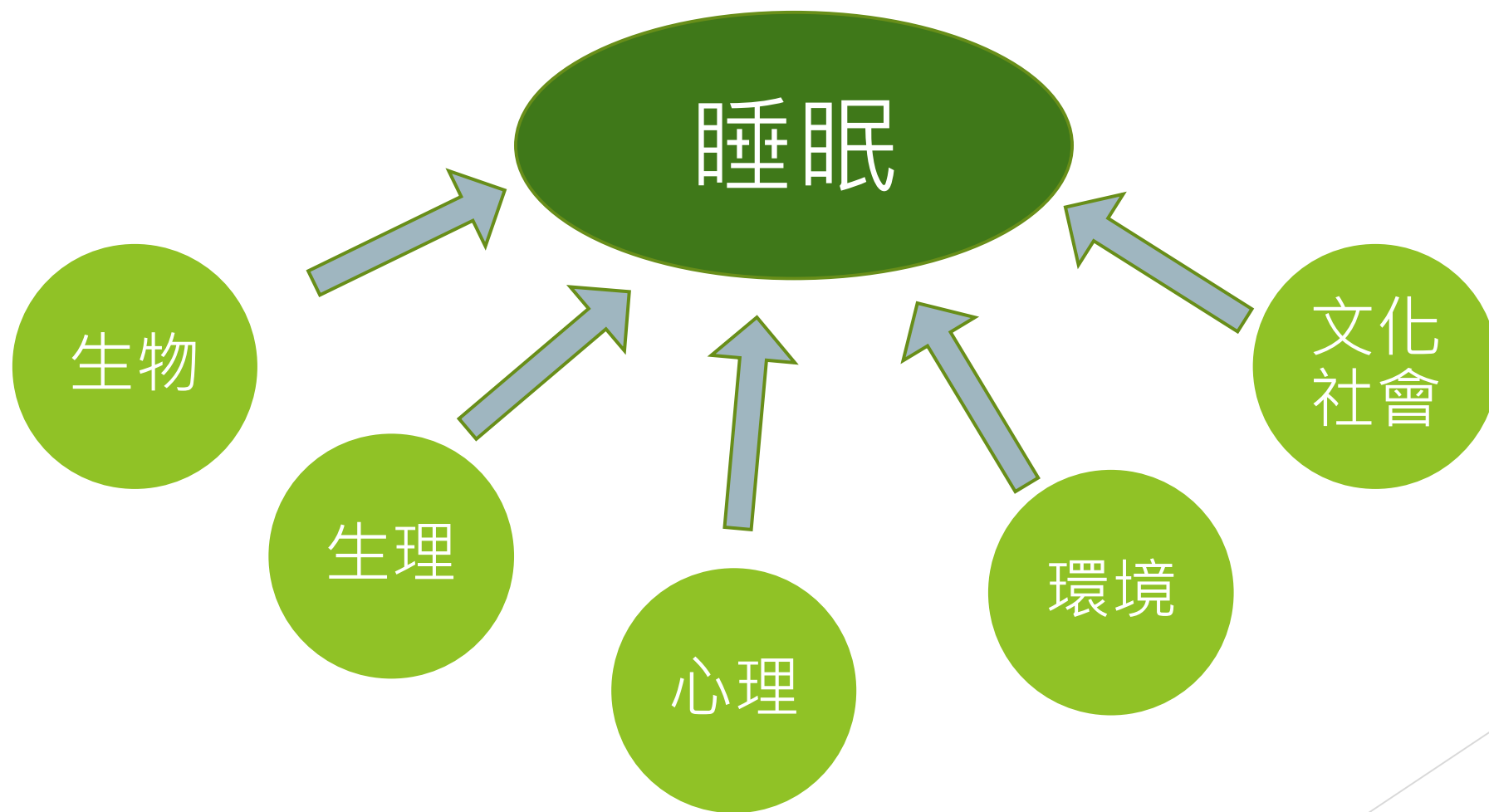
Development of Sleep

- ▶ lengthening of the sleep interval
- ▶ Increased quiet sleep
- ▶ Decreasing active sleep
 - ▶ REM時間減少，比率增加
 - ▶ active sleep without REM sleep decreases
- ▶ Transitional sleep decreases

新生兒睡眠

睡眠影響因素

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睡眠評估

- ▶ 睡眠-覺醒狀態評估
- ▶ 睡眠影響因素

睡眠-覺醒狀態評估

- ▶ Polysomnography(PSG)
- ▶ EEG
- ▶ Heart Rate Variability (HRV)
- ▶ Actiwatch (24小時腕動計)
- ▶ Behavioral Classification

Behavioral Classification

- ▶ 新生兒行為評估量表(Neonatal behavioral assessment score; NBAS)(Brazelton, et.al., 1995)
 - ▶ 肌肉張力與動作、原始反射(吸吮、探索)、行為反應(覺醒程度)
- ▶ The Neonatal Intensive Care Unit Network Neurobehavioral Scale(Lester, et.al., 2004)
- ▶ Anderson Behavioral State Scale (ABSS)(Anderson,et.al., 1988)
- ▶ Infant Motor Performance (TIMP)(Campbell SK. 2005)
- ▶ Neuromotor Behavioral Assessment (NMBA)(Carmichael K, et al. 1997)

新生兒睡眠

促進新生兒睡眠

Improve Infant Sleep

- ▶ Kangaroo Care (KC)
- ▶ Infant Massage
- ▶ Light Modification
- ▶ Sound Modification
- ▶ Breast milk
 - ▶ Tryptophan
 - ▶ Melatonin
 - ▶ DHA

How can you help your baby fall asleep?

建立睡眠習慣

- ▶ 觀察新生兒
- ▶ 作息固定且規律
 - ▶ 第1餐-----最後1餐
 - ▶ 半夜一定要餵奶嗎?
- ▶ 睡眠儀式
 - ▶ 互動玩遊戲→喝奶→換尿布→聽音樂→睡覺
- ▶ 增加白天活動量
- ▶ 讓寶寶自己學習睡覺
- ▶ 舒適環境
- ▶ 與大人同睡?