# ASV, PAV: Toujours à la mode?


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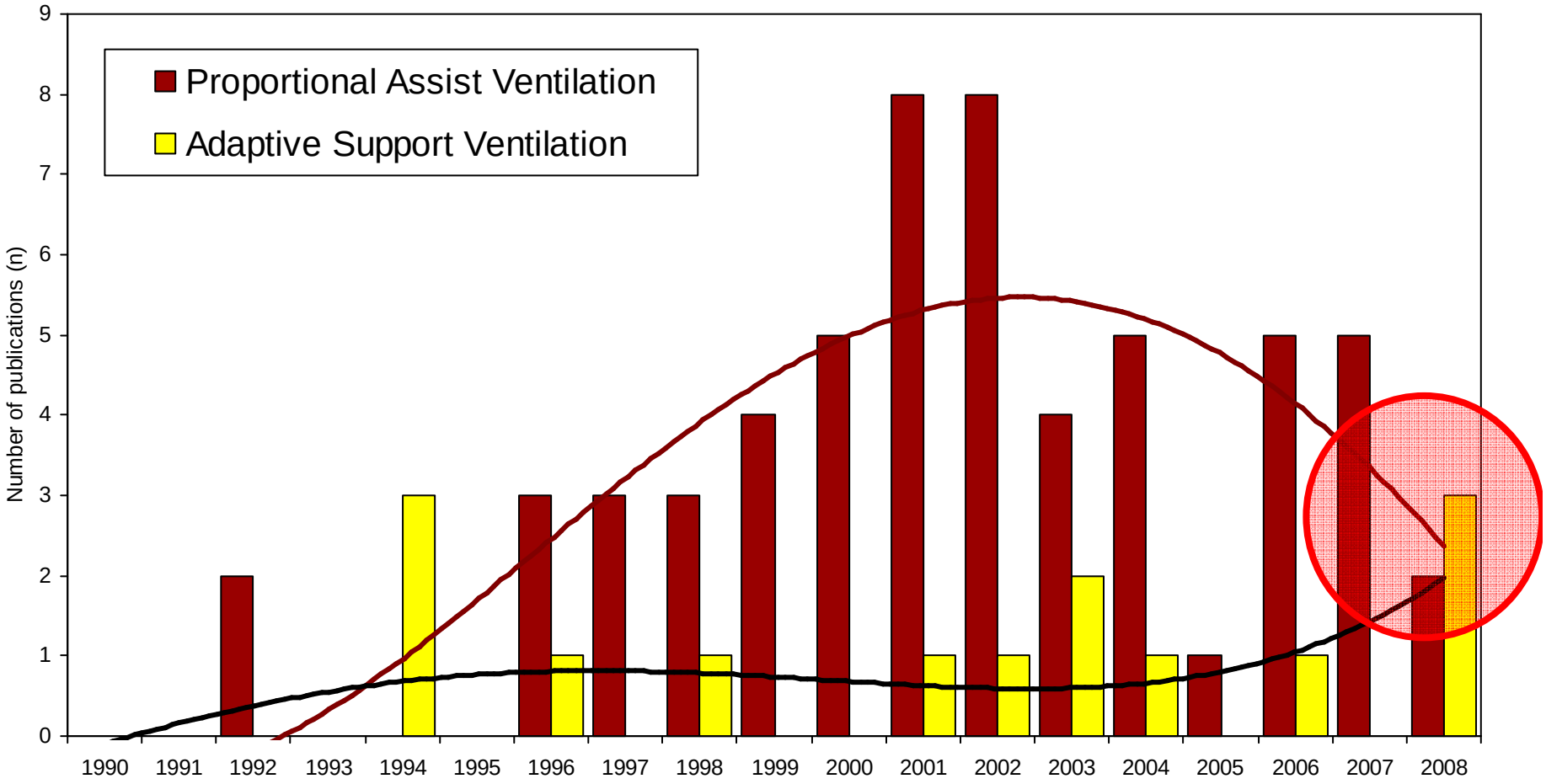
# PubMed Search: yearly publications

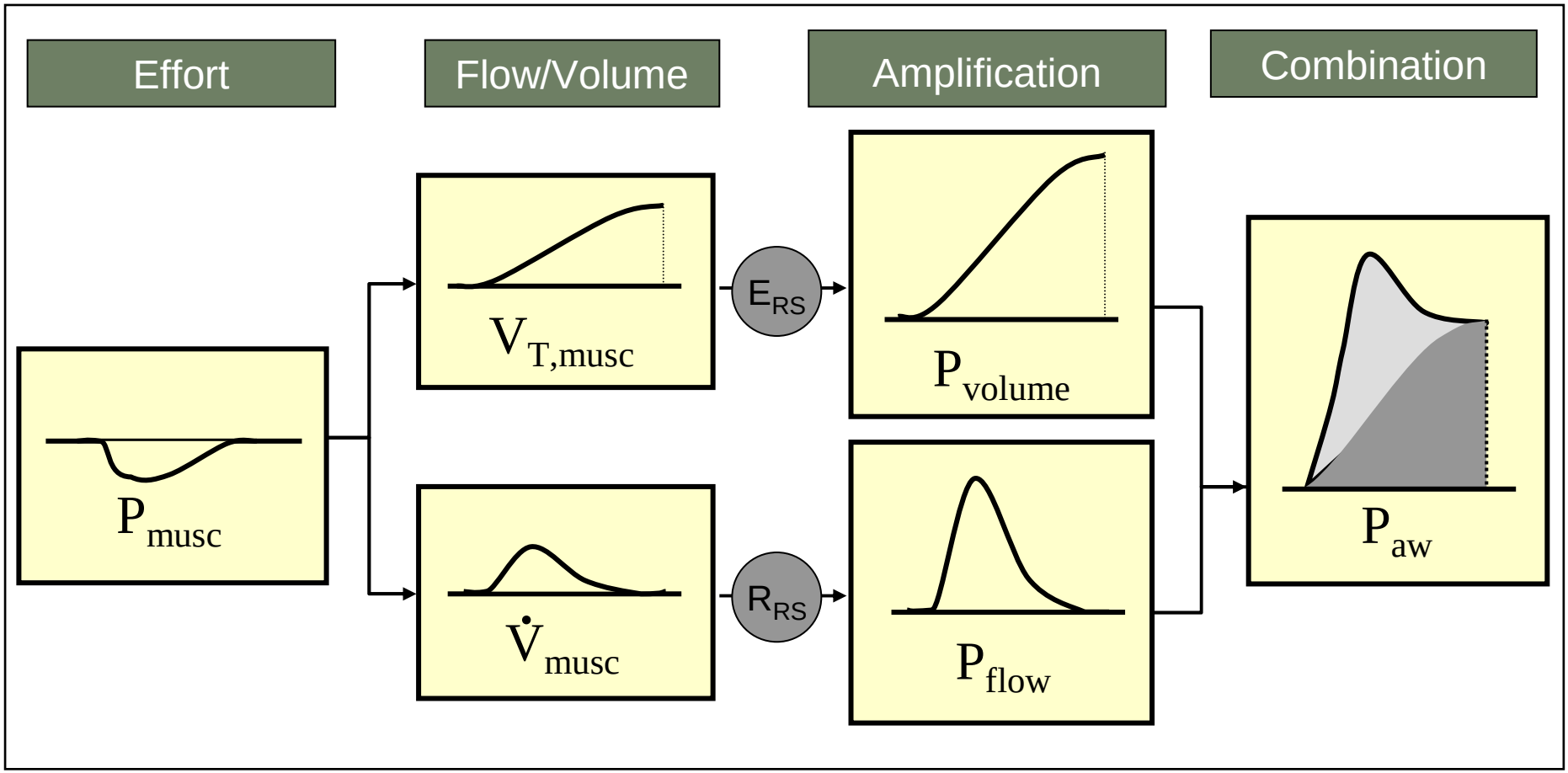


# Randomized Controlled Trials*

| First author | Mode | date | n total | Patients type | Outcome + | Outcome = |
|---|---|---|---|---|---|---|
| Gay | PAV | 2001 | 45 | Mixed | Refusal<br>RR improvement<br>Less complication | NIV failure<br>Mortality |
| Fernandez-Vivas | PAV | 2003 | 117 | Mixed | Comfort<br>Tolerance | NIV failure<br>LOS<br>Mortality |
| Xirouchaki | PAV | 2008 | 208 | Mixed | remaining in spont<br>Synchrony | ICU and Hosp mortality<br>Duration of MV? |
| Rusterholtz | PAV | 2008 | 36 | CPE | | NIV failure<br>Mortality<br>Hdy and AMI |
| Sultzer | ASV | 2001 | 49 | CABG | Duration of MV<br>ABG | LOS |
| Petter | ASV | 2003 | 26 | CABG | Manipulation<br>Alarms | Duration of MV<br>LOS |
| Gruber | ASV | 2008 | 50 | CABG | Duration of MV | ABG<br>Manipulation<br>LOS<br>Mortality |

*: Excluding Cross Over

# Proportional Assist Ventilation (PAV)



# Proportional Assist Ventilation+ (PAV+)

1. **PAV:**
   - PC breath
   - $P_{insp}$ w/i breath proportional to flow/volume
   - Positive feedback
   - $V_T$, RR and $P_{insp}$ not set
2. **($R_{RS}$ and $E_{RS}$)$_{auto}$**
   - Random micro-perturbations
   - $R_{RS}$ : pulse reductions in Paw in early inflation phase.
   - $E_{RS}$ : Brief end-inspiratory occlusions

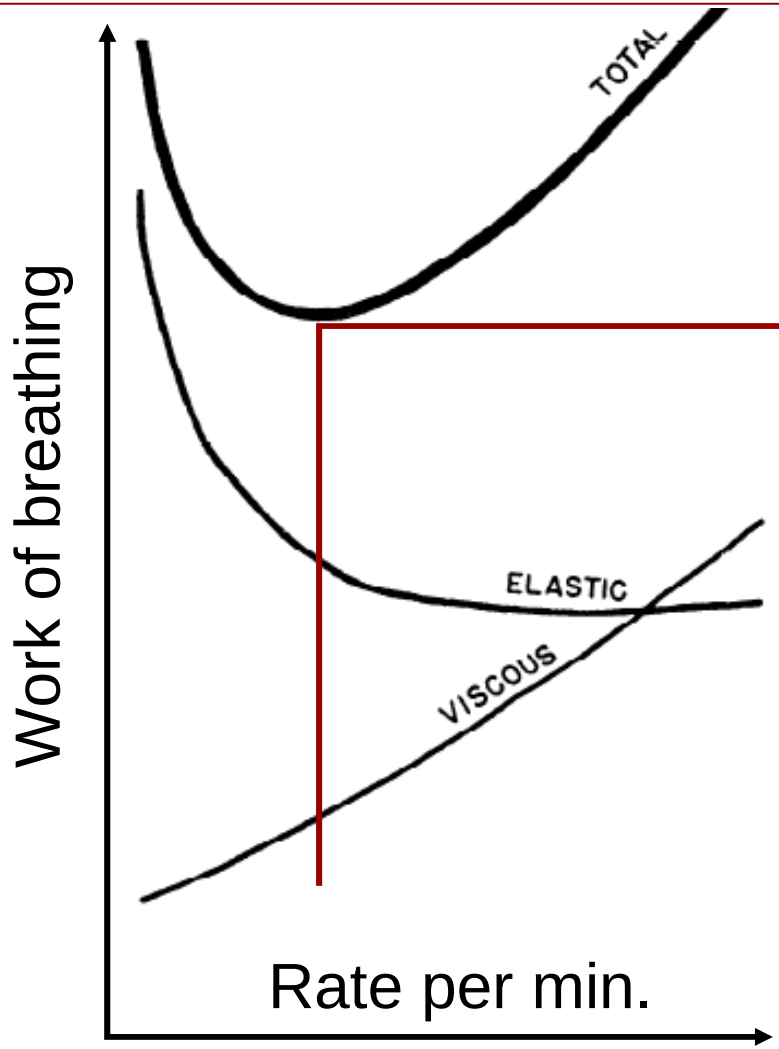
Younes Am J Respir Crit Care Med, 2001, Younes Am J Respir Crit Care Med, 2002, Kondili Intensive Care Med, 2006

# Adaptive Support Ventilation (ASV)

## 1. ASV

- PC breaths: PCV and PSV
- MV (set) = $RR_{opt.} * V_{T,\ opt.}$
- Regulated: [$RR_{mand}$ for $RR_{opt.}$] + [$P_{insp}$ for $V_{T,\ opt.}$]
- Negative feedback
- Safety: [PCV ↔ PSV] + [dynamic safety rules]

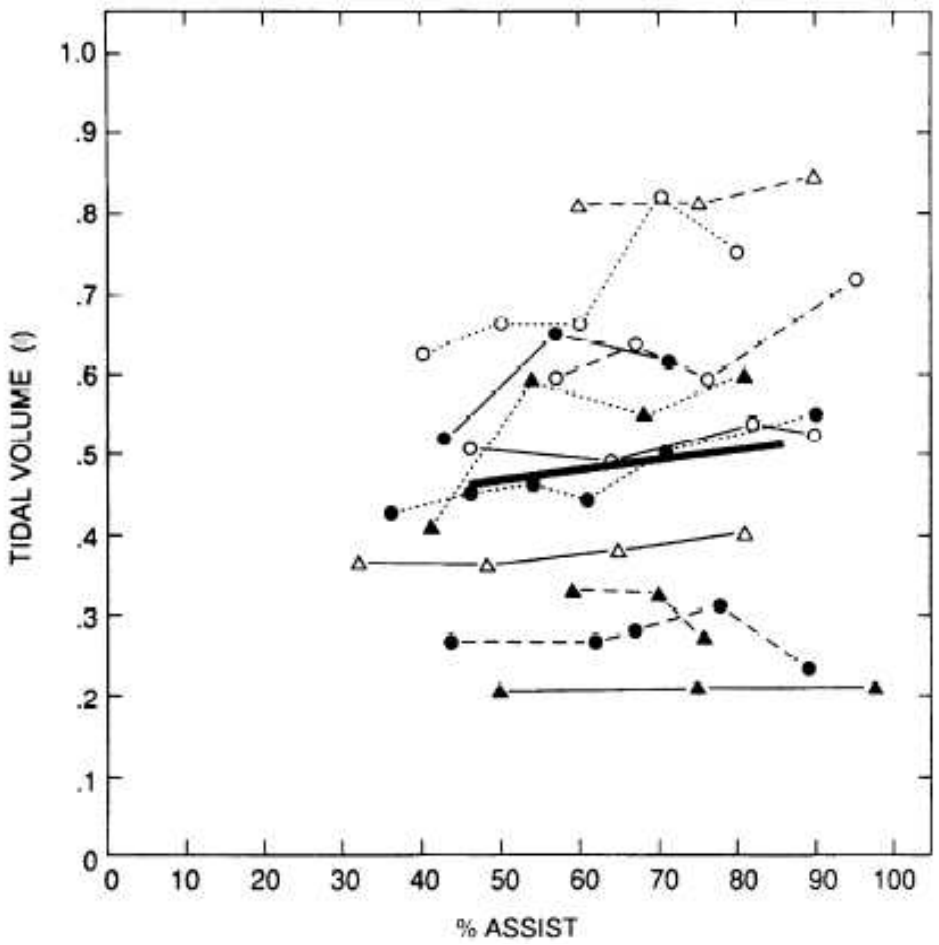
# What is “optimal” RR and VT

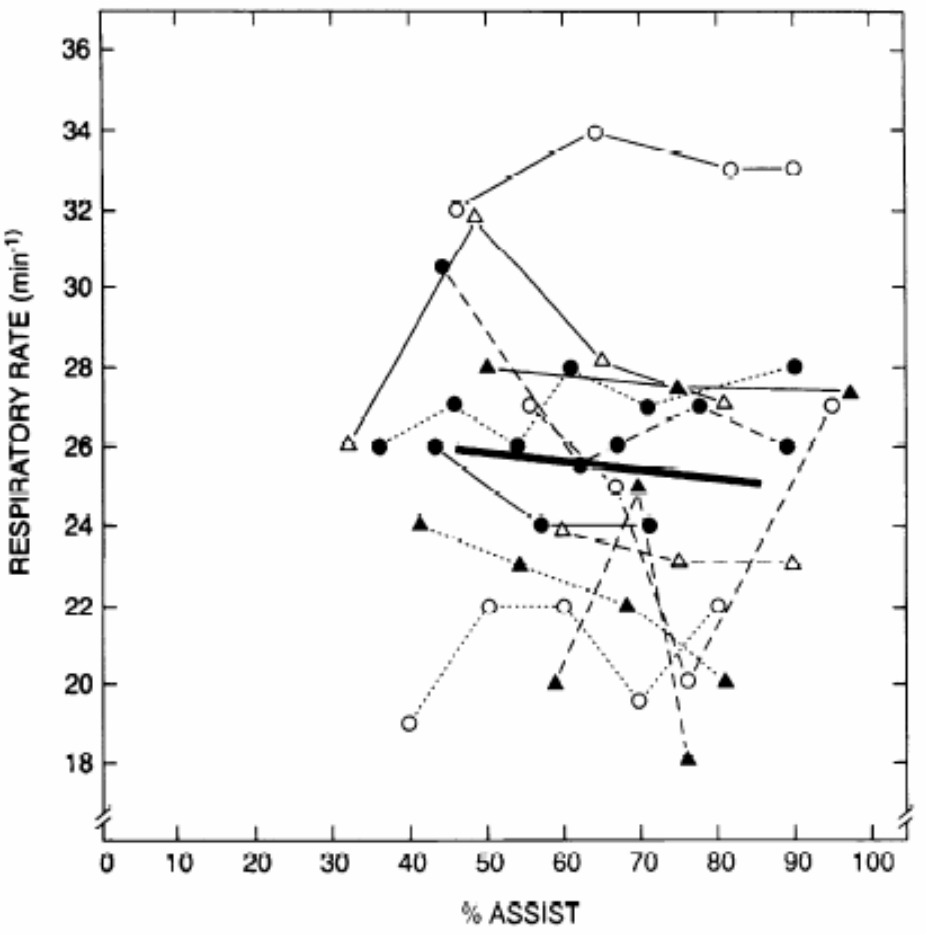



$$RR_{opt} \approx \frac{k}{RC_{\exp}}$$

Otis A, J Applied Physiol. 1950

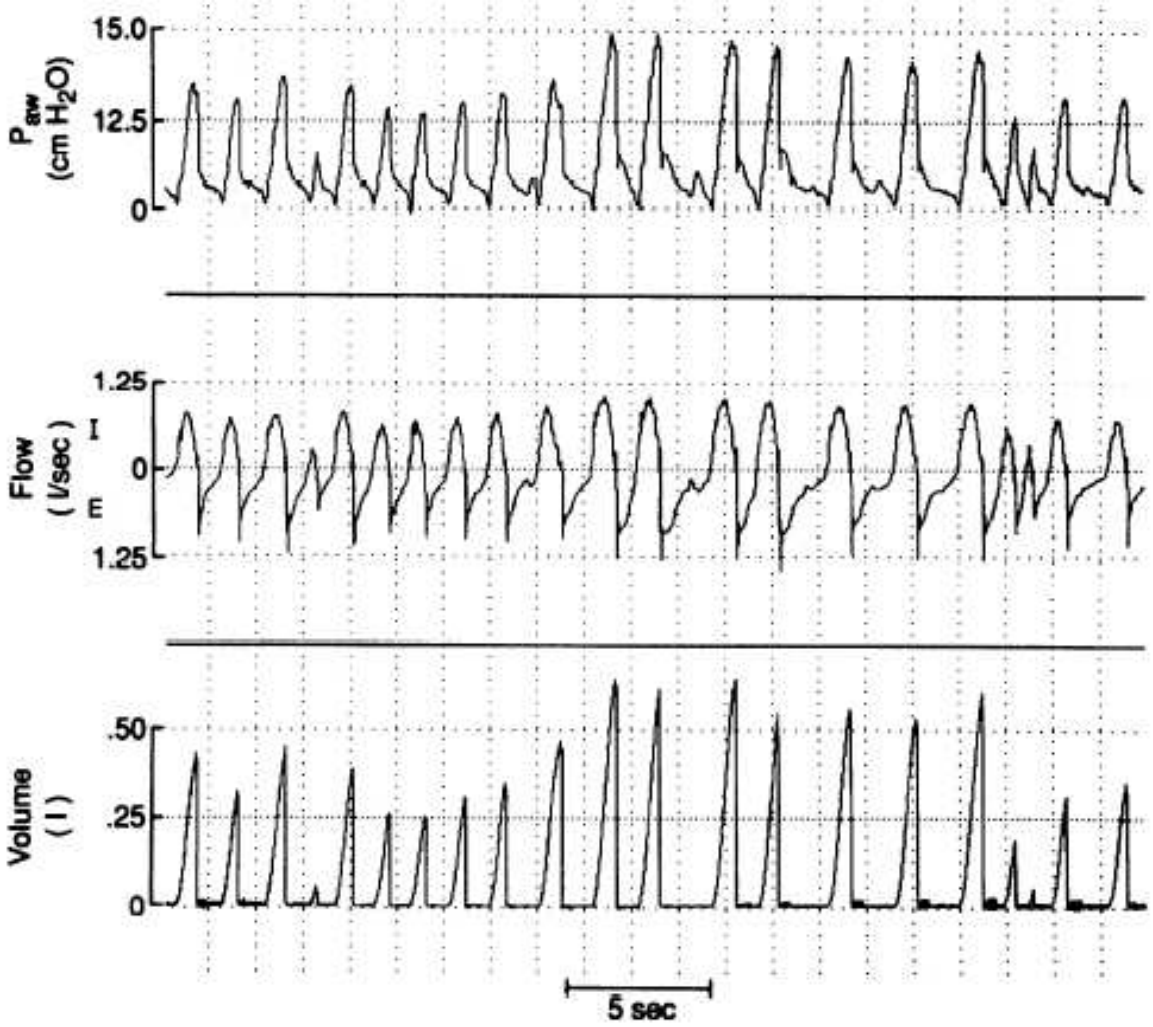
# PAV: Physiological tool…



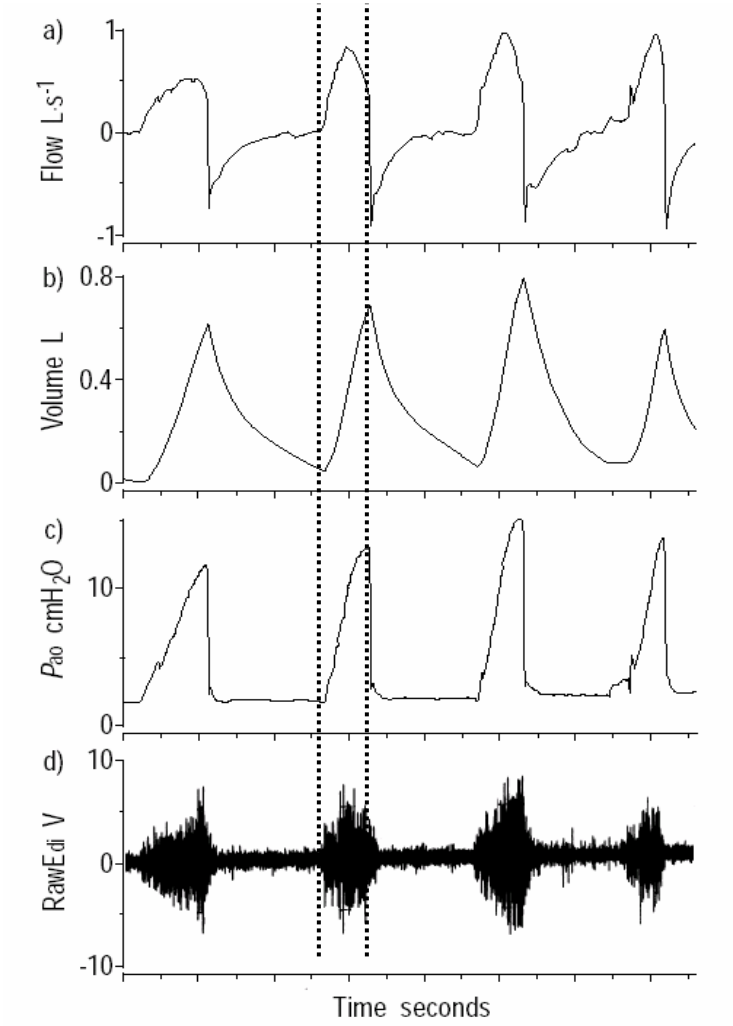




Marantz JAP 1996

# PAV: Variability and Comfort

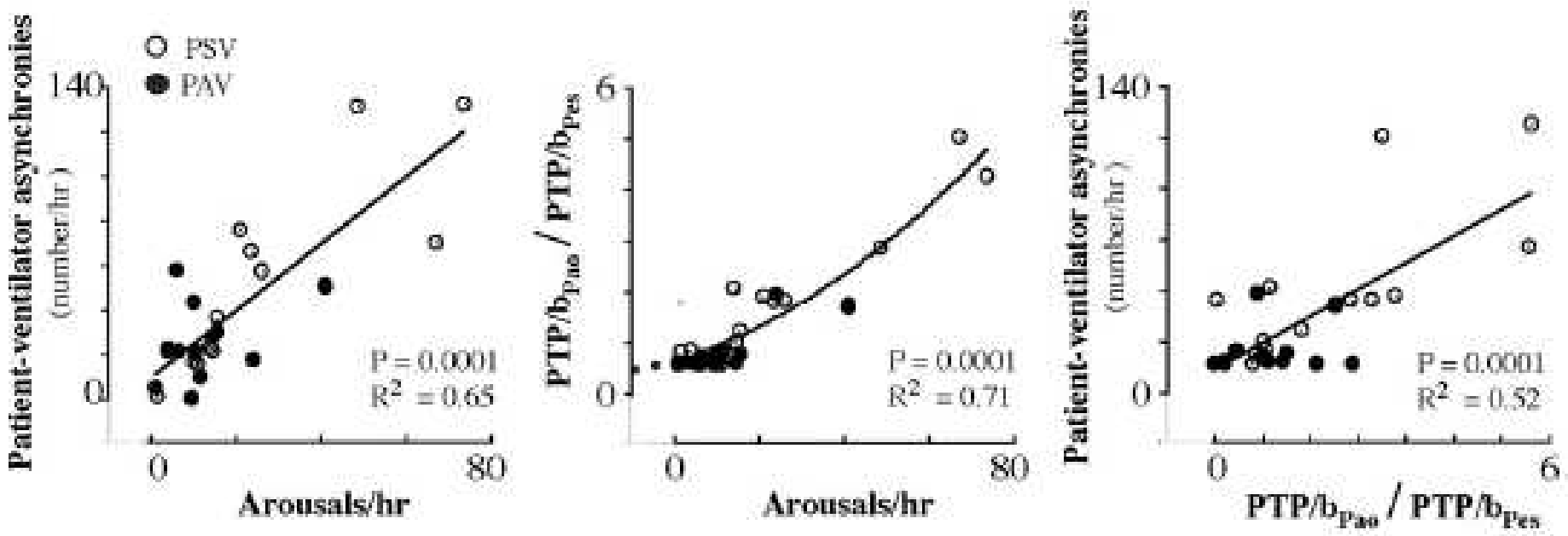


# PAV: Synchrony and Comfort



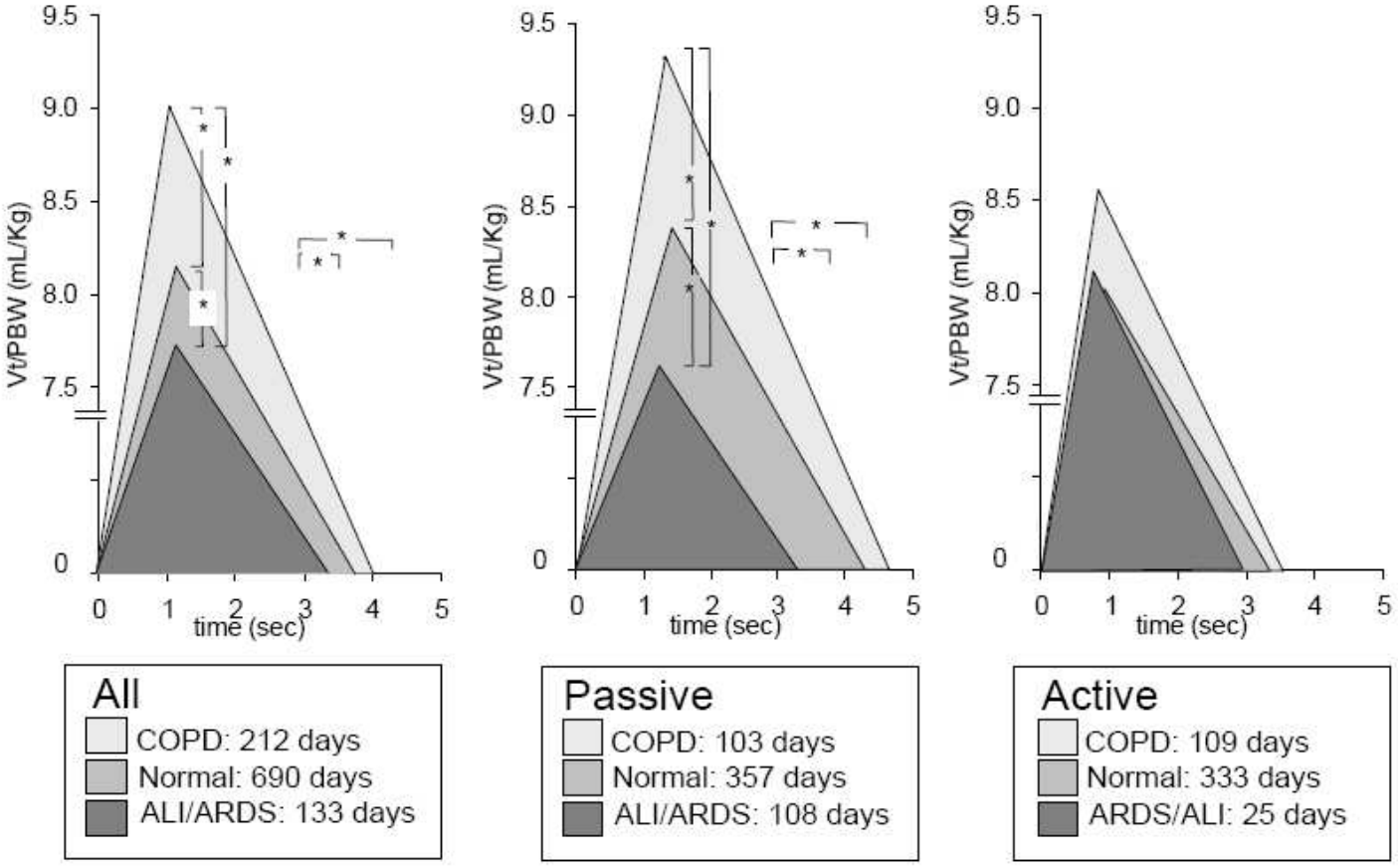

Polese, Eur Resp J 2000

# PAV: Comfort and Synchrony




Bosma Crit Care Med 2007

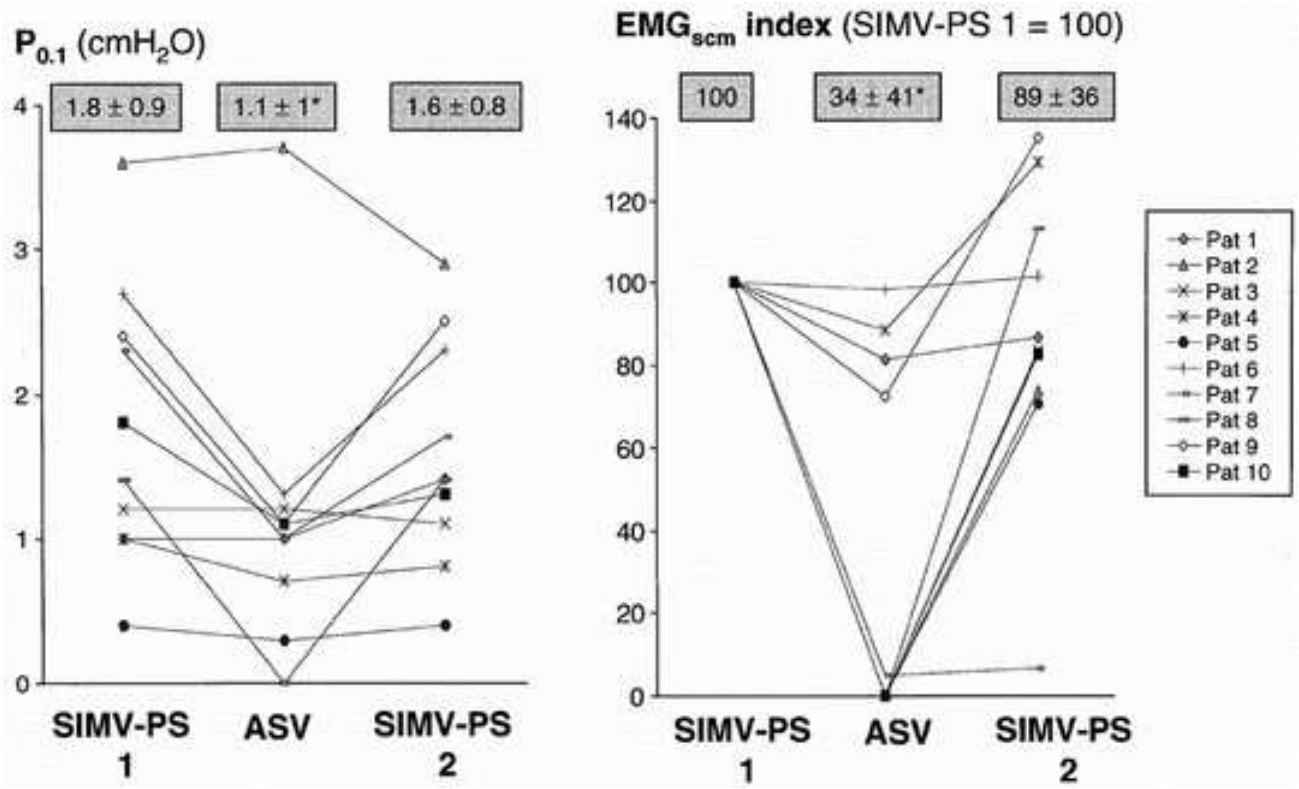
# ASV: Adaptive to the respiratory mechanics




Arnal et al. Intensive Care Med 2008

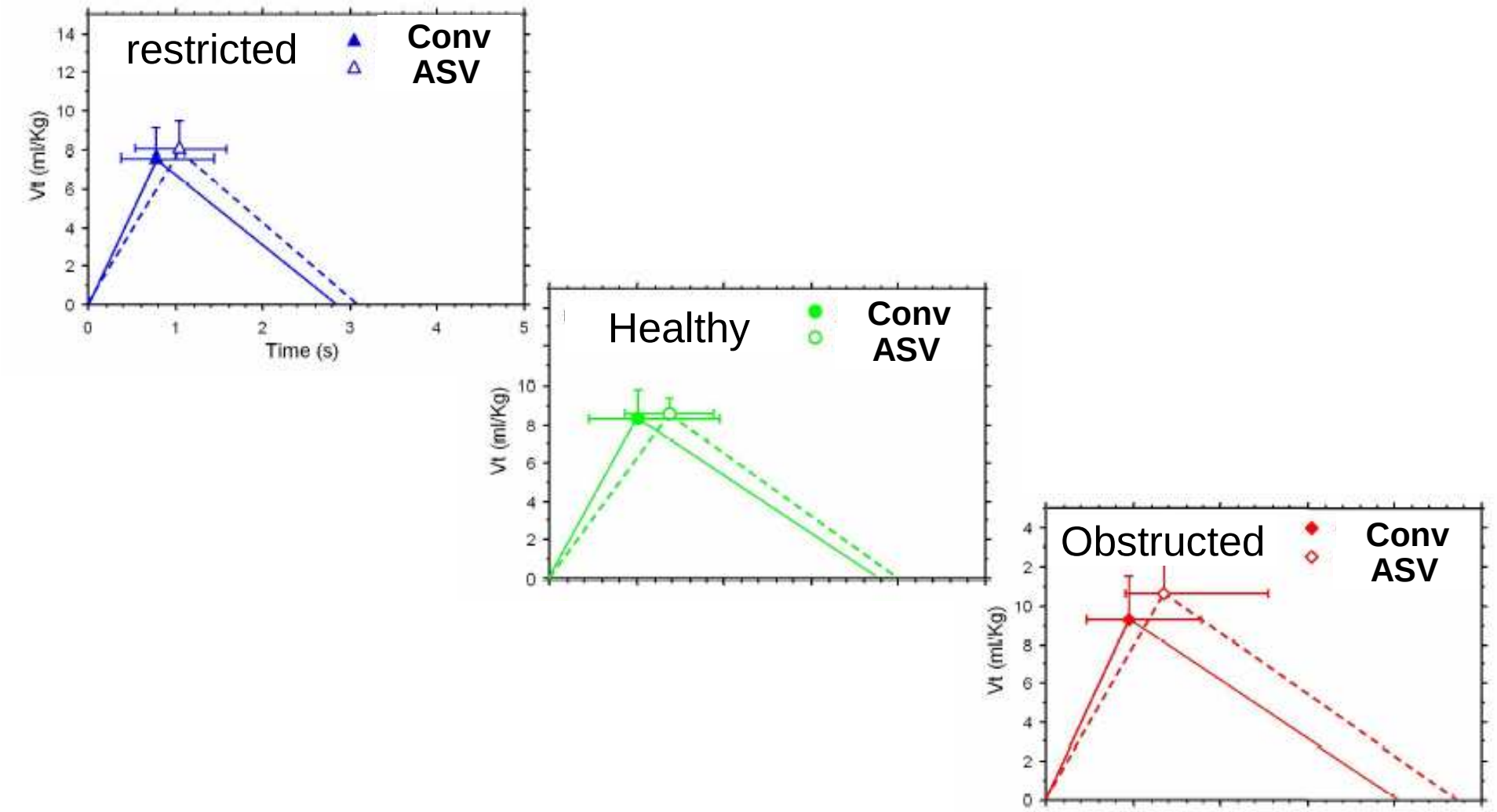
Belliato et al. Int J Artif Org. 2004

# ASV: Optimizing the WOB…



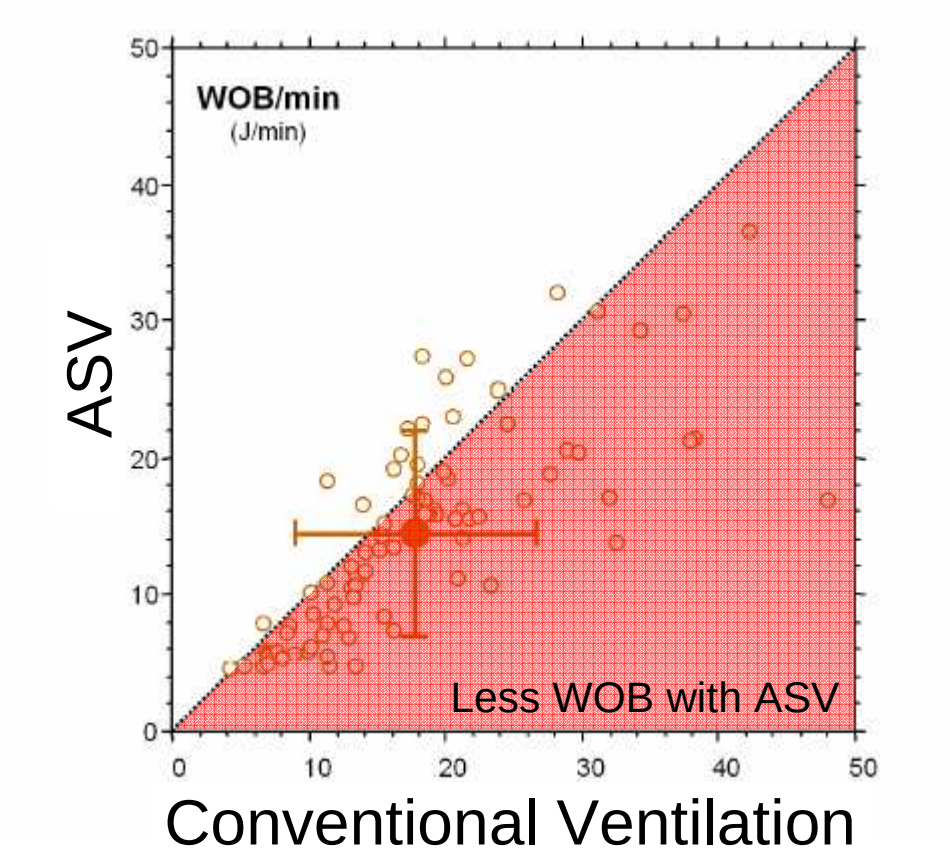

Tasseaux, Crit care Med 2000

# ASV: As well as the experts…



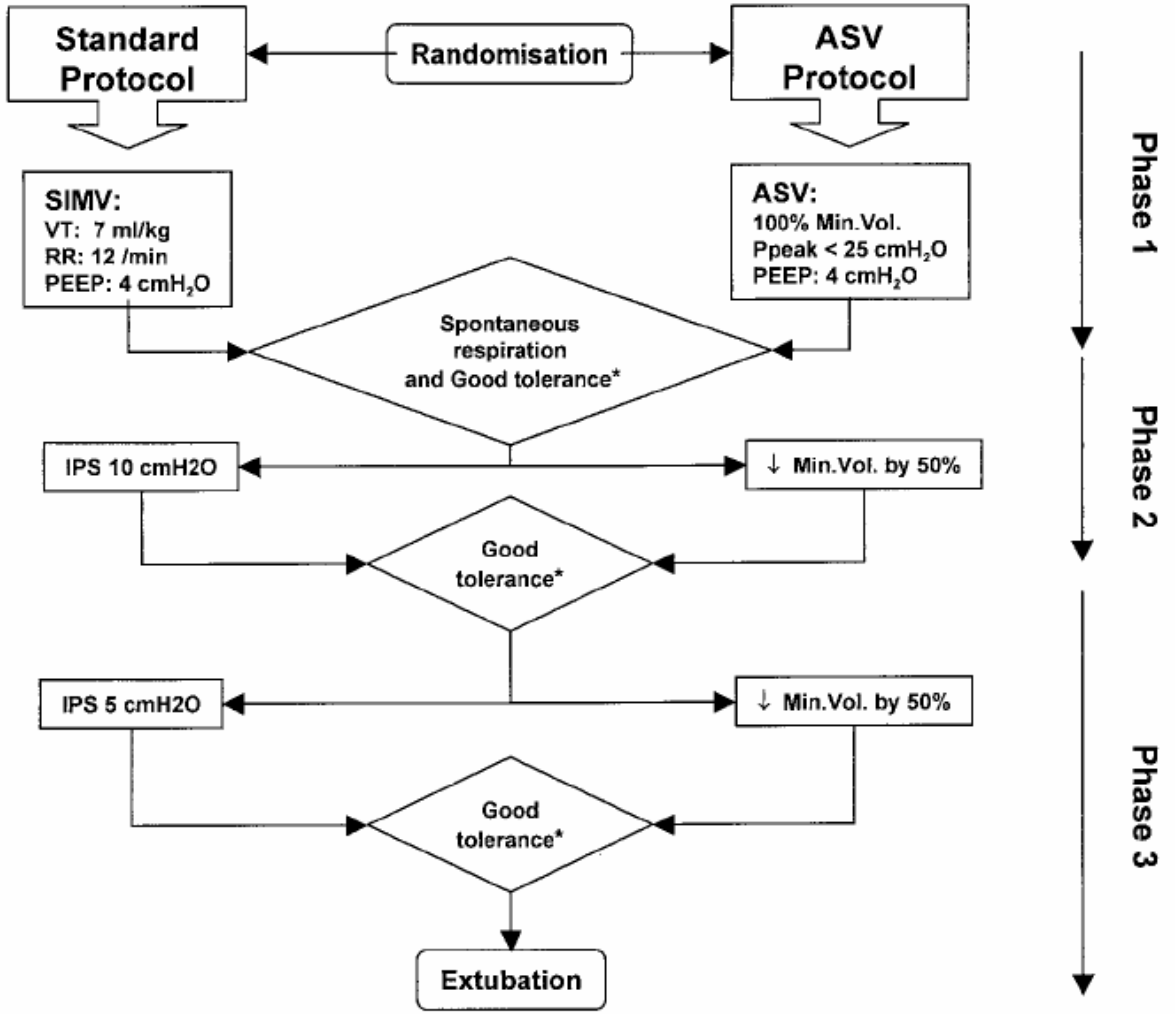

Iotti G, Intensive Care Med 2005 [abstract]

# ASV: Better than the experts?




Iotti G, Intensive Care Med 2005 [abstract]

# ASV: Clinical evidences – Post CABG patients




Sultzer, Anesthesiology, 2001

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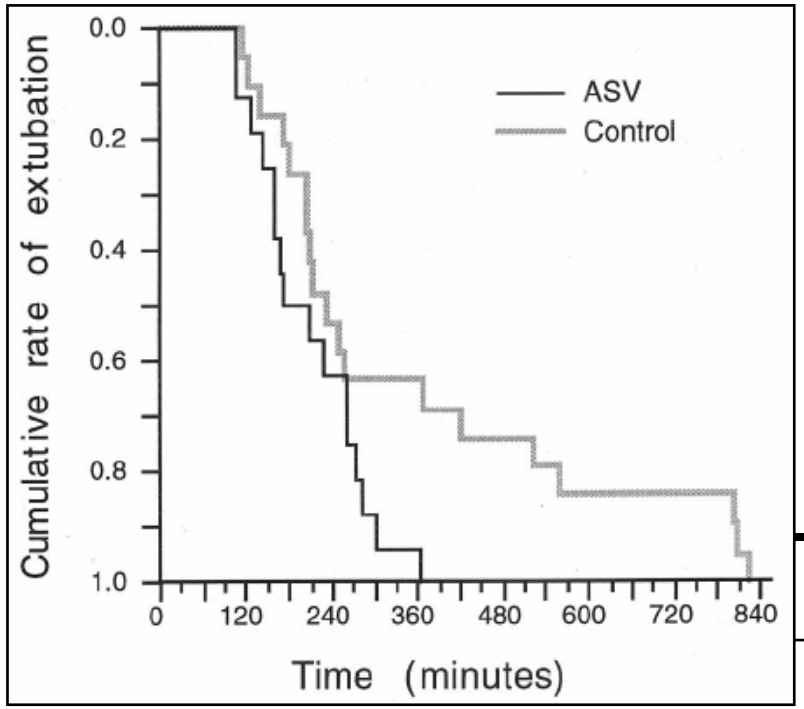


| | Control | ASV | p value |
|---|---|---|---|
| | n = 20 | n = 16 | |
| Ventilation (min) | 243 | 193 | 0.02 |
| Extubation H6 (n) | 12 | 15 | < 0.01 |

Sultzer, Anesthesiology, 2001

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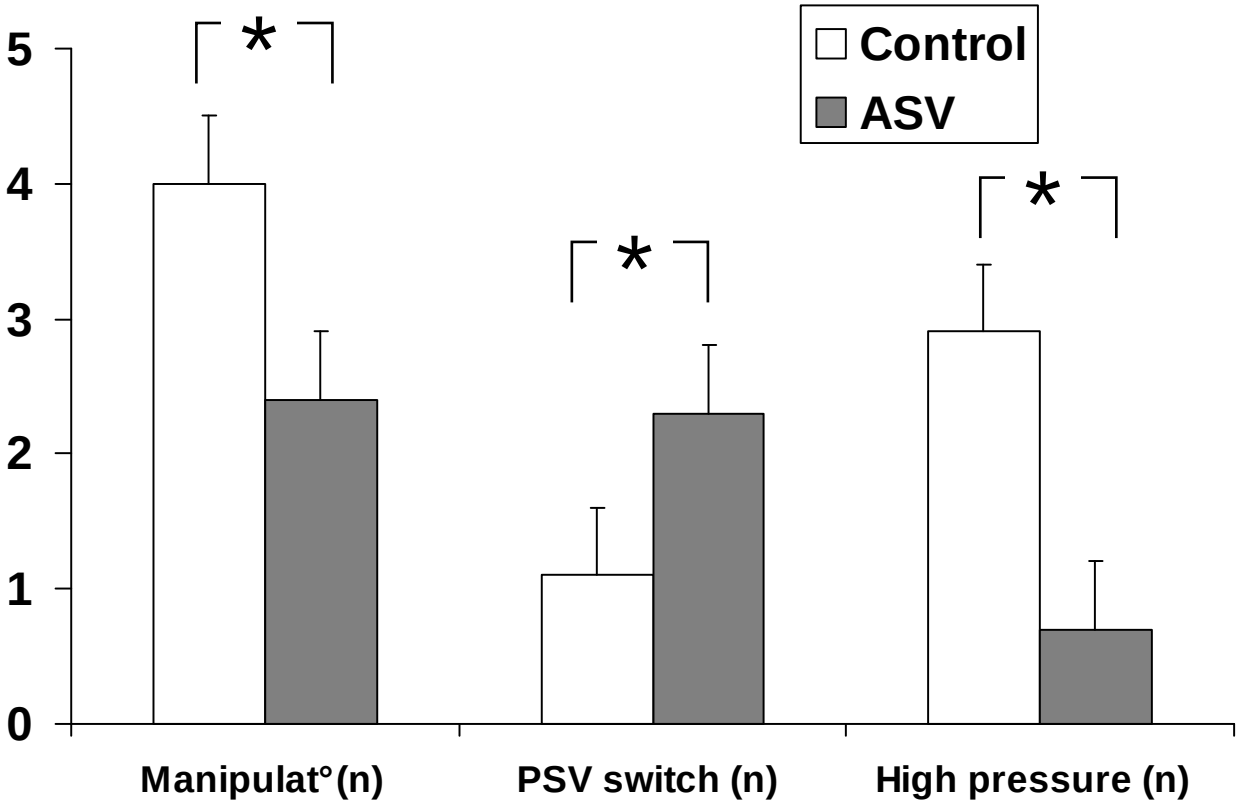
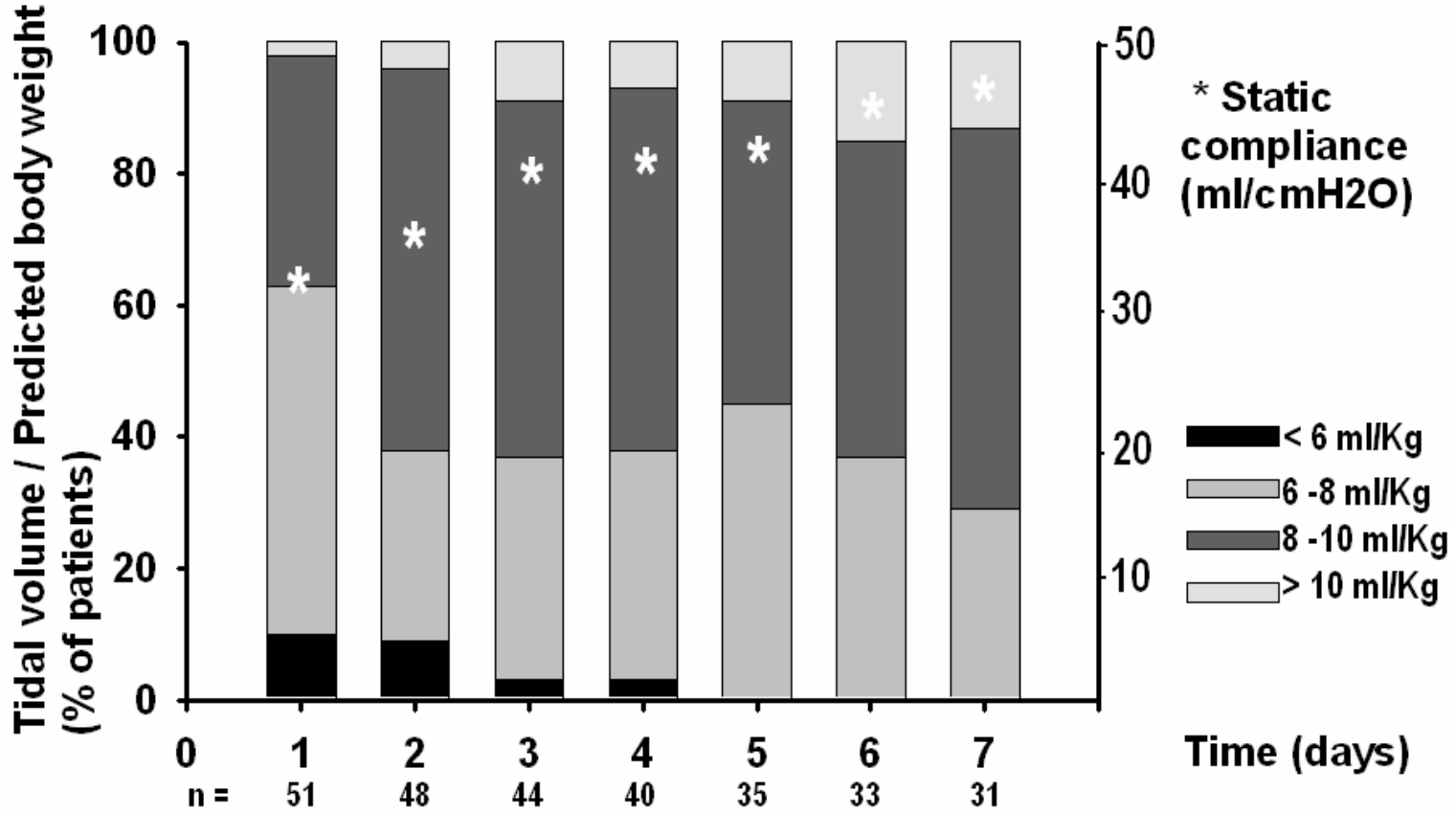



Petter, Anesth Analgesia, 2003

# ASV in ARDS patients – automatic VT adjustment




Arnal JM, Intensive Care Med 2006 [abstract]

# PAVNAVAKBSASV????????

| | PAV | NAVA | KBS | ASV |
|---|---|---|---|---|
| **Principle** | Pinsp ~ flow | Pinsp ~ $EMG_{dia}$ | Pinsp to RR in comfort zone | Pinsp/RR to minimize WOB |
| **Breaths type** | ~ PSV | ~ PSV | PSV | PSV & PCV |
| **Passive pts** | NO | NO | NO | YES |
| **Active pts** | YES | YES | YES | YES |
| **Auto weaning** | NO | NO | YES | YES |

Wysocki, Crit Care Clin North Am, 2007

# Questions?

# 机械通气的新模式：成比例辅助通气(PAV)、适应性支持通气(ASV)、

关键词：机械通气 PAV ASV

## 简介

新的机械通气模式如成比例辅助通气(Proportional Assist Ventilation，PAV)、适应性支持通气(Adaptive Support Ventilation，ASV)和智能监护(SmartCare，SC)目前已在市场上推出。呼吸机的输出与病人的实际需要相匹配。所有以上模式至少通过一种闭合环(Close-Loop)系统来工作：

PAV 通过调

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