

Post-Discharge Nausea and Vomiting after Ambulatory Surgery

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PDNV after ambulatory surgery

Learning Objectives

1. Define the scope of PDNV after ambulatory surgery
2. Identify patients at elevated risk for PDNV
3. Create an evidence-based plan for PDNV prevention

Fourth PONV Consensus Guidelines

- What's new:
 - 9000 studies since the previous guidelines
 - Multi-modal prophylaxis in patients with ≥ 1 risk factor
 - New therapies:
 - Amisulpride
 - Palonosetron
 - Rolapitant



PDNV after ambulatory surgery

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Scope of PDNV

- Approximately **35 million** ambulatory surgeries in the U.S. each year
 - 1/3 under general anesthesia

Scope of PDNV

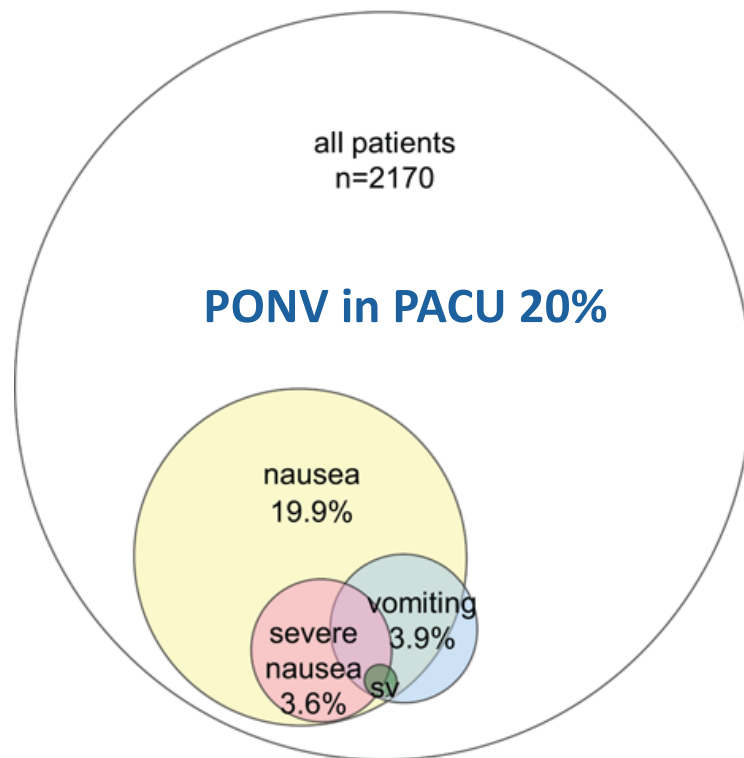
- Not a new problem...
- Phone interviews of 193 patients after discharge
- **35% experienced PDNV**
- Most did not experience nausea in PACU
- Substantial distress and impairment
- Greater difficulty:
 - taking care of self/others
 - performing household tasks
 - taking medications

Scope of PDNV Continued...

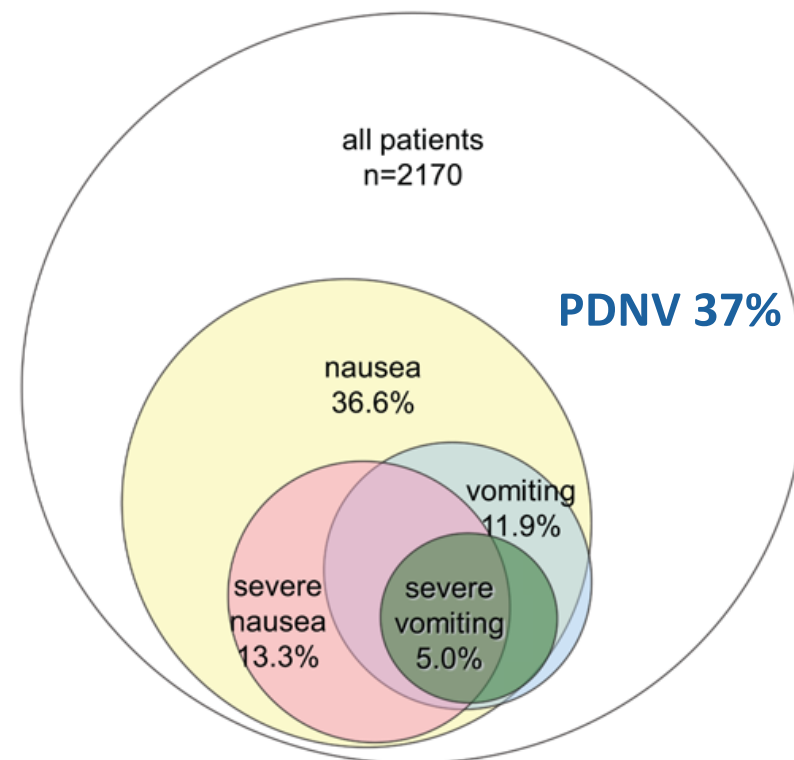
- Prospective multicenter observational study 2007-2008
- 2,170 adults undergoing GA at ASCs
- Follow-up through POD#2
- **Incidence of PDNV was 37%**

Postop vs. Postdischarge N/V

A Post-anesthesia Care Unit



B Post-discharge



PDNV after ambulatory surgery

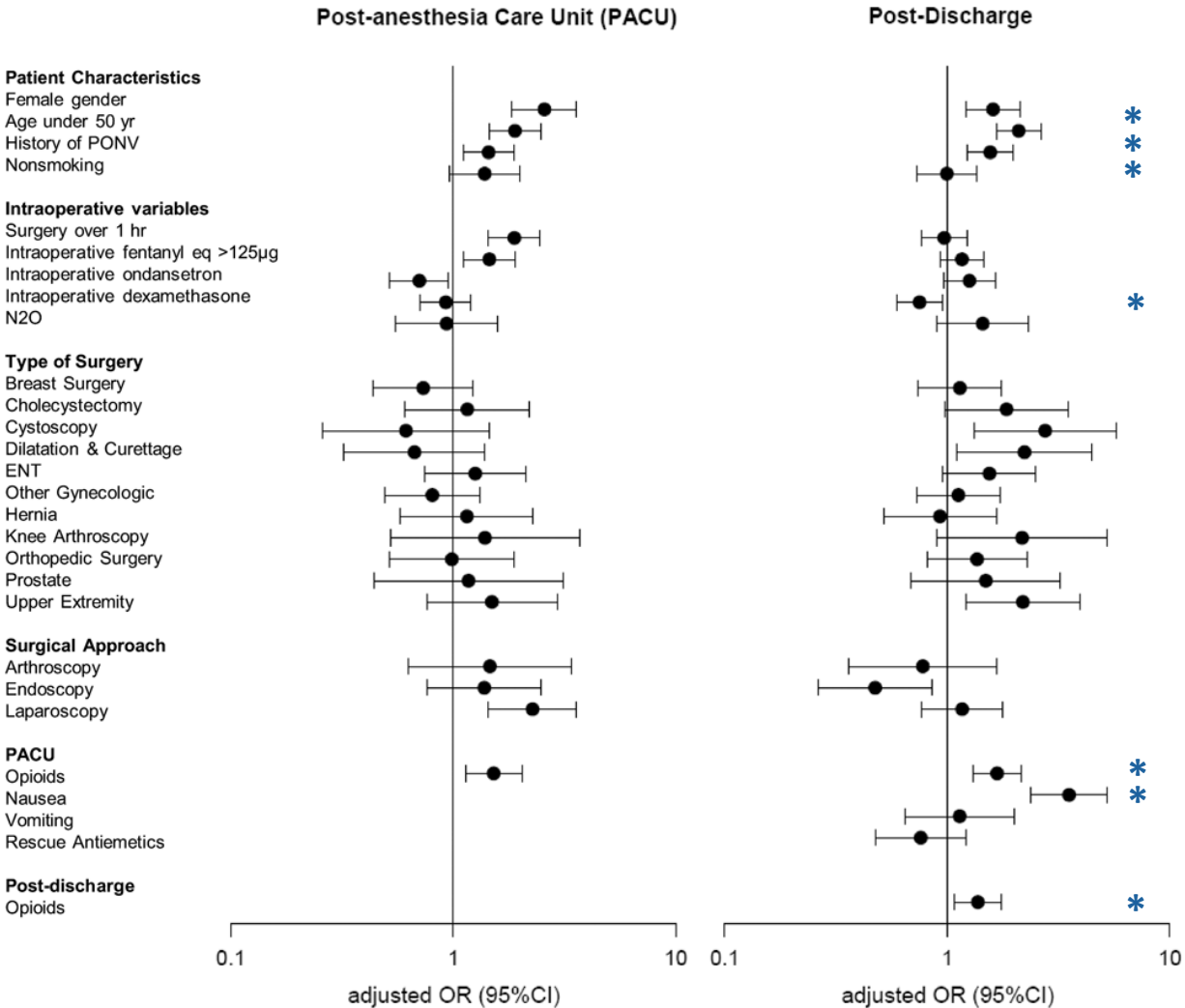
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Study Population

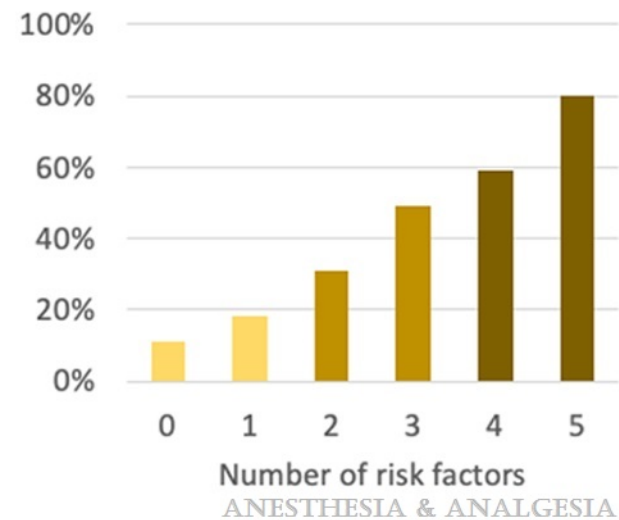
- Most patients (66.4%) received sevoflurane
- None of the centers used TIVA, but some patients received propofol by infusion or additional boluses
- 77% received ondansetron
- 35% received 2 intraoperative antiemetics
- 12% received 3 intraoperative antiemetics

Risk Factors: PONV vs. PDNV



PDNV Risk score

Risk Factors	Points
Female Gender	1
History of PONV	1
Age <50	1
Use of opioids in PACU	1
Nausea in PACU	1
Sum of points	0-5



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PDNV Prevention Overview

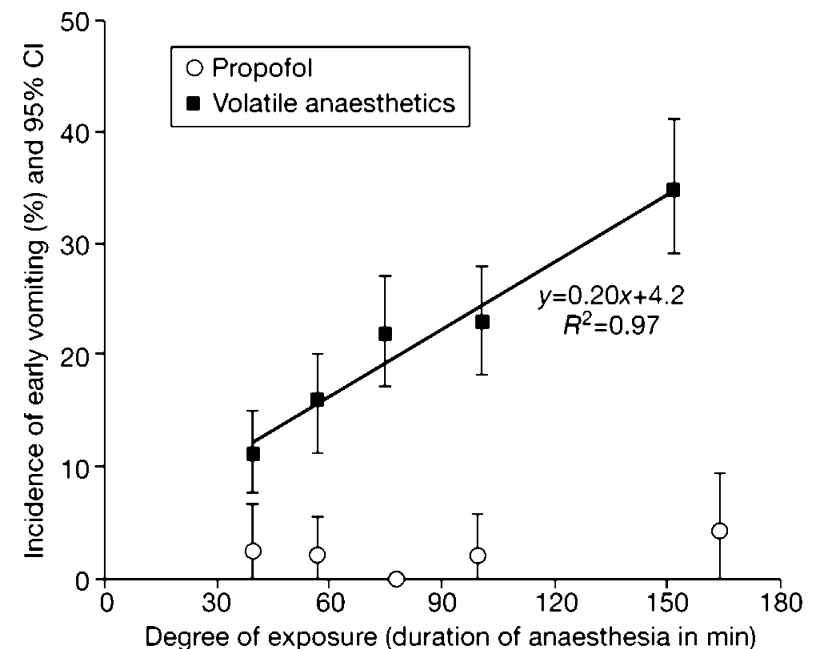
- Risk reduction:
 - Avoidance of general anesthesia when possible
 - Opioid-sparing techniques:
 - Multi-modal and regional analgesia
 - TIVA with Propofol?
- Pharmacologic Prophylaxis:
 - 5HT₃ receptor antagonists
 - NK-1 receptor antagonists
 - Scopolamine
 - Dopamine receptor antagonists
- Alternative techniques:
 - Acupuncture
 - Acupressure

Avoidance of General Anesthesia

- General anesthesia increases the risk of PONV 11-fold
- 50% of patients in an earlier study of PDNV received regional anesthesia or MAC
- Incidence of PDNV was 9.1%

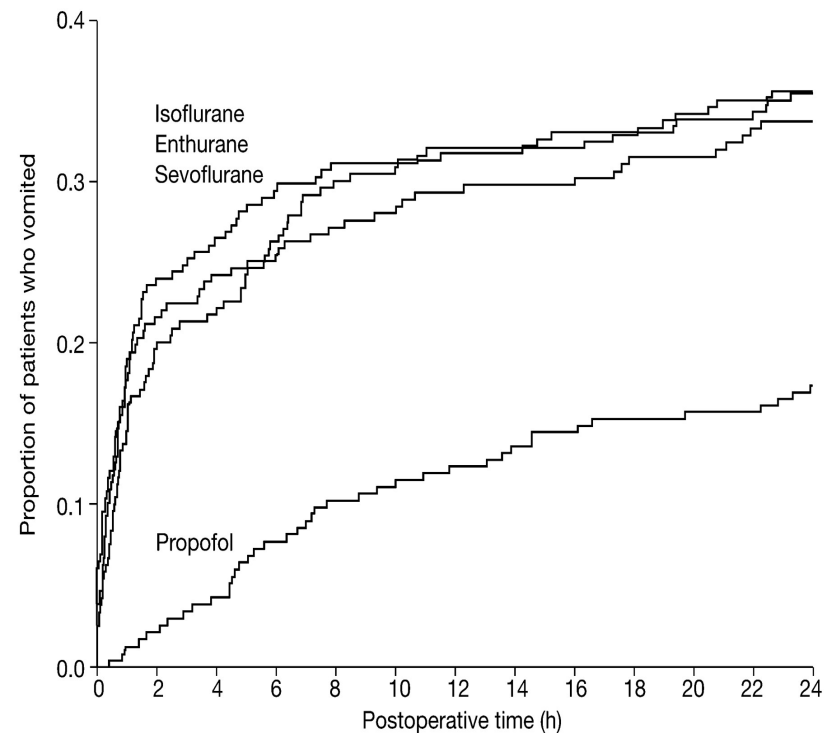
How about using TIVA?

- RCT of 1180 patients, 5-way factorial design
- Combinations of anesthetics, opioids, antiemetics
- PONV at 0-2h vs 2-24h
- **Volatile anaesthetics** were largest risk factor in **early** period (**0-2h**)
 - OR for sevoflurane 14.5 (5.6-37.4)



How about using TIVA?

- After 2h, parallel rise in % of patients who experience PONV
- Suggests difference in **late (2-24h)** PONV not caused by the chosen anesthetics



Delayed PONV

- In **hours 2-24**, main predictors of PONV were:
 - Being a child 5.7 (3.0-10.9)
 - PONV in the early period 3.4 (2.4-4.7)
 - Use of postoperative opioids 2.5 (1.7-3.7)

How about using TIVA?

- Meta-analysis 58 trials comparing volatile anesthesia (Iso, Sevo, Des) vs TIVA in ambulatory surgery
- Incidence of post-discharge nausea in the trials that reported:
 - 21.5% volatile group
 - 13.5% TIVA group
 - NNT 12.5

How about using TIVA?

- Meta-analysis 18 trials comparing volatile anesthesia (sevo, des) vs TIVA in ambulatory surgery:
- Incidence of PDNV in the trials that reported:
 - 20.8% Volatile group
 - 23.9% TIVA group
 - $p = 0.26$

How about using TIVA?

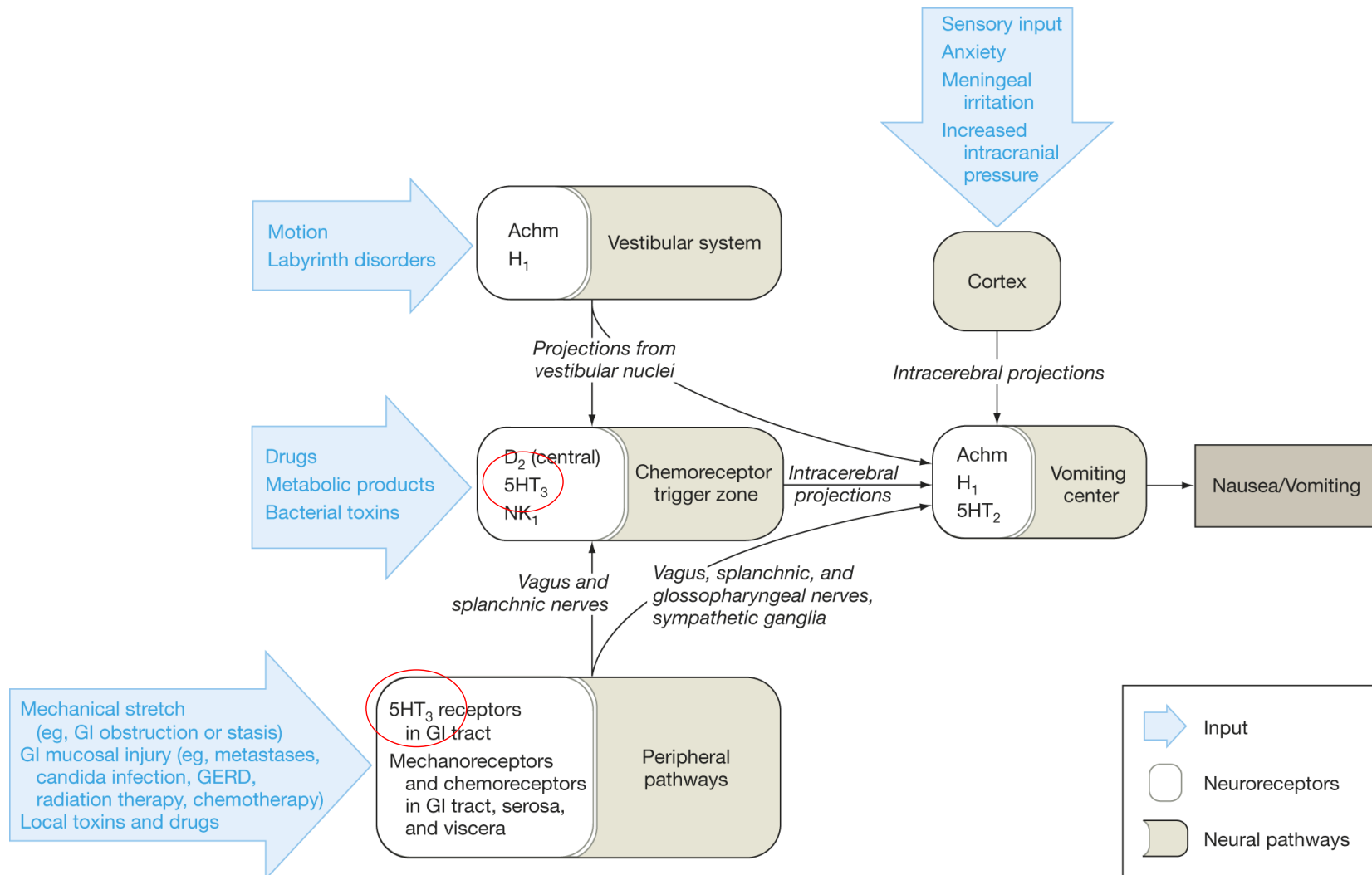
In summary...

well established for prevention of PONV in PACU,
but likely limited or small benefit in preventing
PDNV

PDNV Prevention

- Risk reduction:
 - Avoidance of general anesthesia when possible
 - Opioid-sparing techniques:
 - Multi-modal analgesia
 - Peripheral nerve and fascial plane blocks
 - TIVA with Propofol?
- **Pharmacologic Prophylaxis:**
 - **5HT3 receptor antagonists**
 - **NK-1 receptor antagonists**
 - **Scopolamine**
 - **Dopamine receptor antagonists**
- Alternative techniques:
 - Acupuncture
 - Acupressure

5HT₃ Receptor Antagonists



Oral Disintegrating Ondansetron

- RCT of 64 patients with ≥ 3 Apfel risk factors undergoing ambulatory gyn surgery
- Control:
 - Ondansetron 4mg IV
- Intervention:
 - Ondansetron 4mg IV, Dexamethasone 8mg IV, Ondansetron 8mg oral disintegrating tablet upon discharge, am POD #1 & 2
- Post-discharge nausea:
 - **Control 57%**
 - **Intervention 20%**

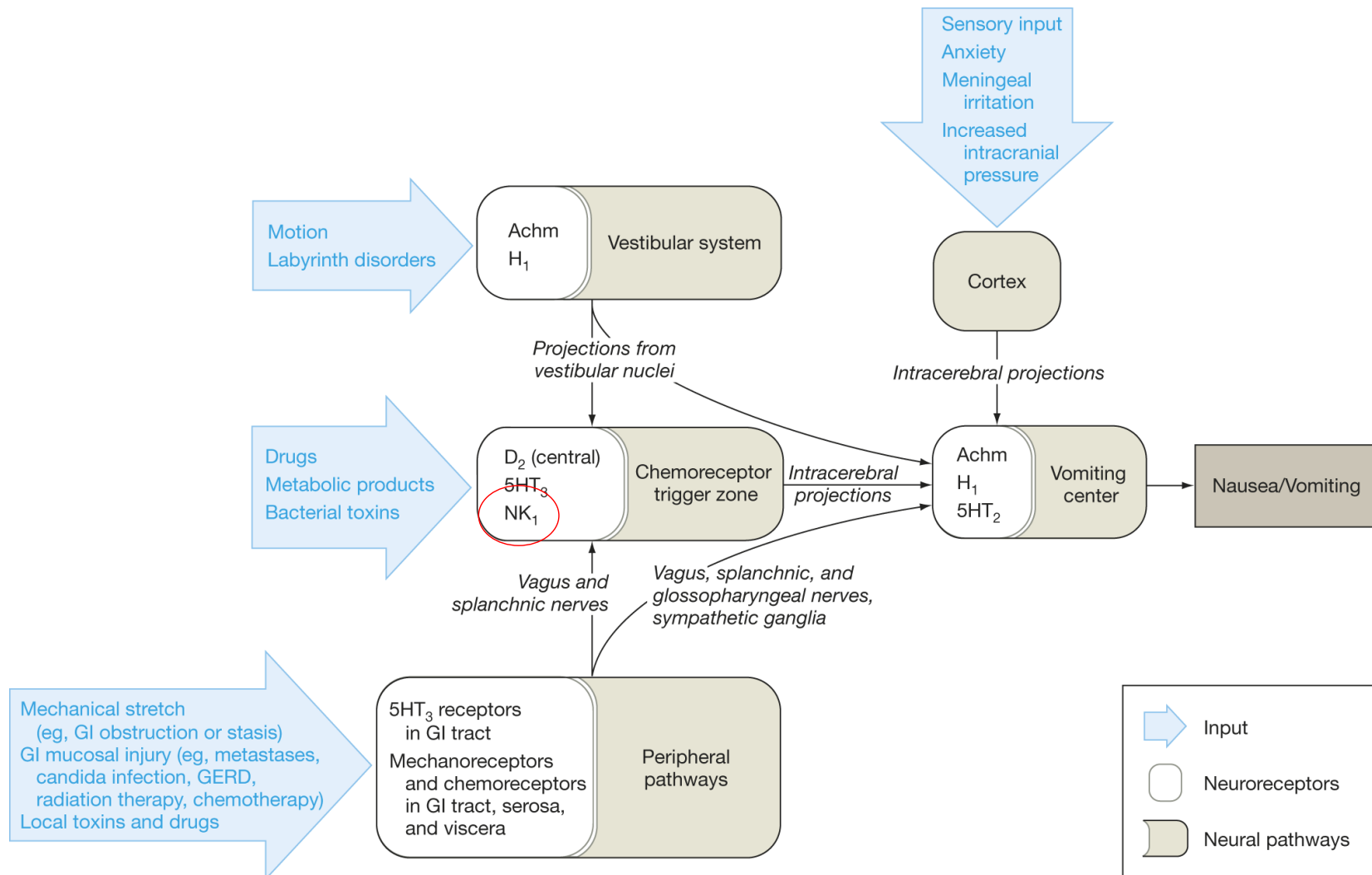
Oral Disintegrating Ondansetron

- RCT of 60 patients undergoing ambulatory gyn laparoscopy
- Control:
 - Ondansetron 4mg IV
- Intervention:
 - Ondansetron 4mg IV, ondansetron oral disintegrating tablet before discharge and 12h later
- Post-discharge nausea
 - **Control 50%**
 - **Intervention 30%**

Long Acting 5HT₃ Antagonists

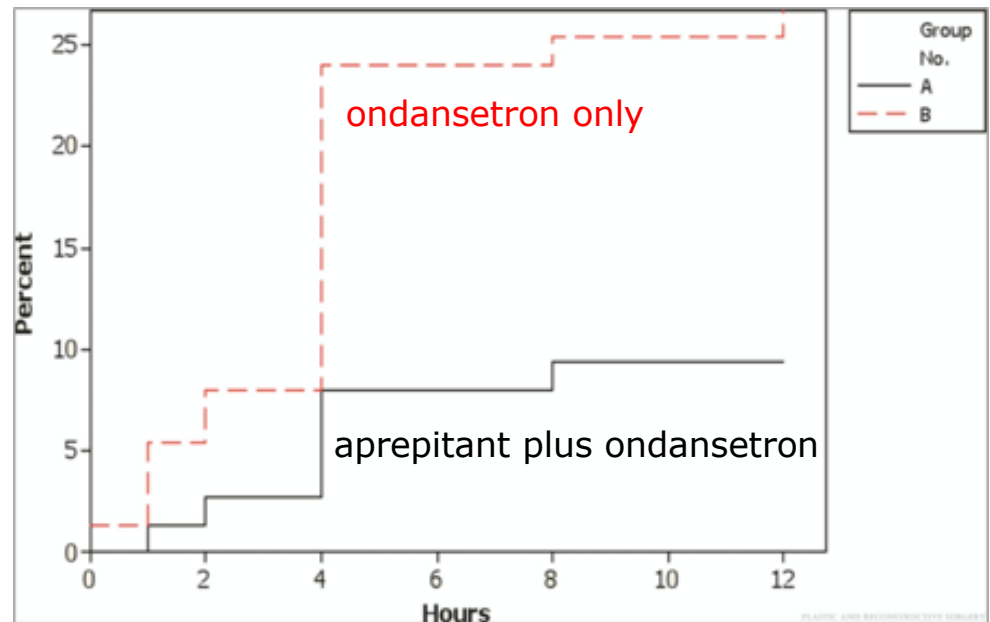
- Palonosetron 0.075mg
 - Demonstrated benefits for PONV prevention up to 72h in inpatients (*A&A 2008; 107:439-444*)
 - Not studied specifically for PDNV
- Granisetron 0.1mg
 - No significant difference in PDNV compared to ondansetron (*A&A 2006;102:1387-93*)
 - In combination with promethazine (intraop and PO for 3 days post-op) superior to promethazine alone in PONV/PDNV (*Can J Anaesth 2009;56:829-36*)

Neurokinin-1 Receptor Antagonists



NK-1 Receptor Antagonists

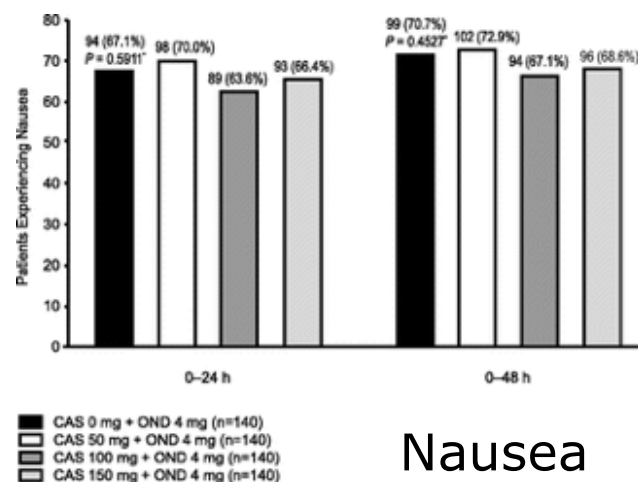
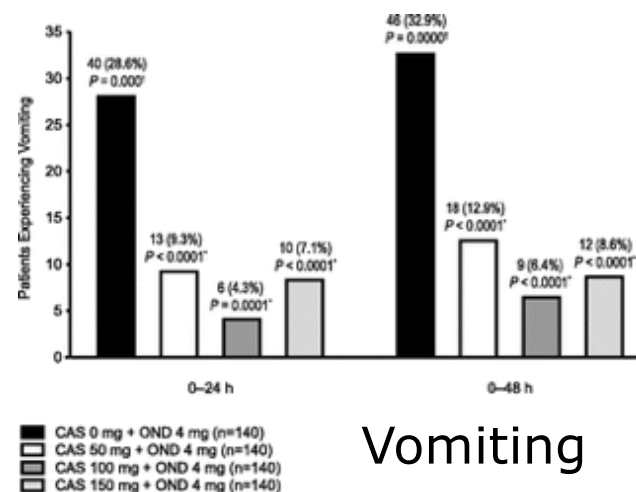
- RCT of 150 ambulatory plastic surgery patients with ≥ 2 Apfel risk factors
- Ondansetron + aprepitant or placebo
- **Vomiting:**
 - **Placebo 30%**
 - **Aprepitant 9%**
- Majority of vomiting episodes occurred after discharge
- **No difference in nausea**



Kaplan-Meier plot time to first emesis

Neurokinin-1 Receptor Antagonists

- RCT of 702 patients with ≥ 4 Apfel risk factors, gynecologic surgery or lap chole
- Ondansetron + casopitant or placebo
- Casopitant protective against vomiting for 120h from surgery
- No difference in nausea

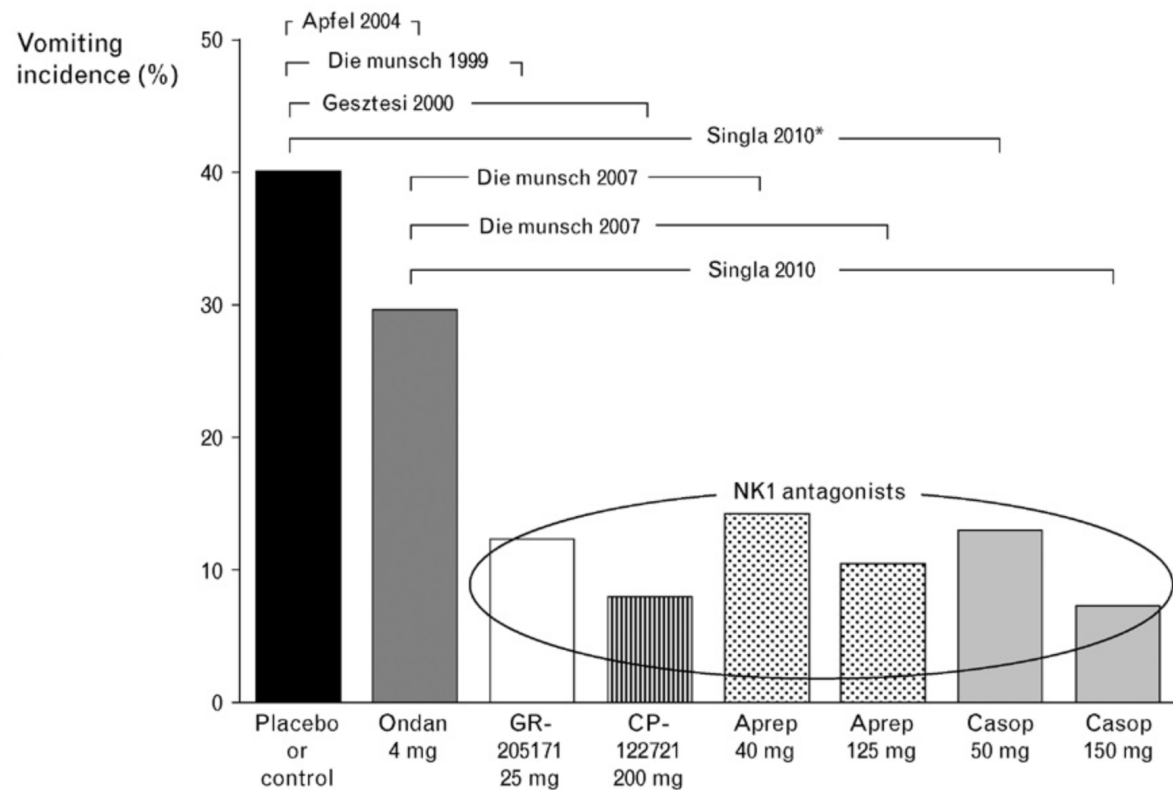


Neurokinin-1 Receptor Antagonists

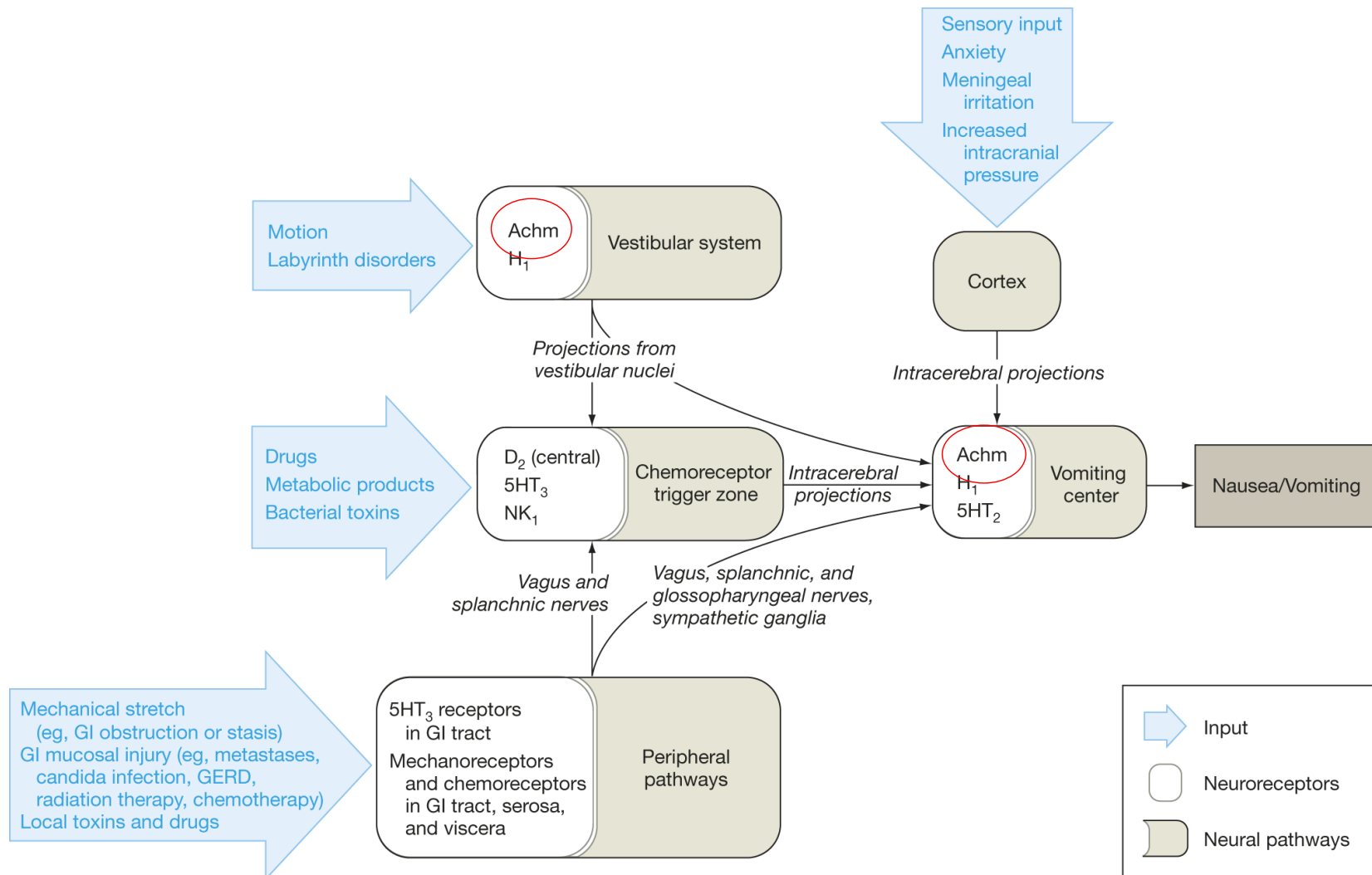
- RCT of 484 patients with ≥ 2 Apfel risk factors undergoing breast, shoulder, thyroid, lap chole, gyn surgery
- Ondansetron + casopitant or placebo
- First 24h after surgery:
 - Casopitant group: 69% complete response (no vomiting, retching, rescue therapy)
 - Placebo group: 59% complete response
 - OR 1.54 (1.05-2.25)
- Failed to show significant benefit in preventing late vomiting (>24h)

Neurokinin-1 Receptor Antagonists

- Benefit is primarily in decreasing risk of **vomiting** across studies

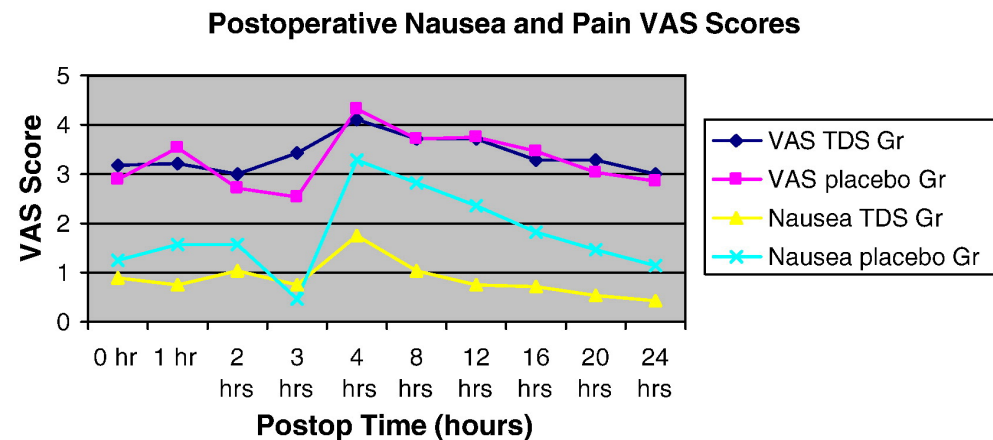


Scopolamine



Transdermal Scopolamine

- RCT of patients with ≥ 3 Apfel risk factors undergoing ambulatory plastic surgery
- Ondansetron + scopolamine or placebo patch
- Reduction in nausea in hours 8-24 after surgery with scopolamine



Transdermal Scopolamine

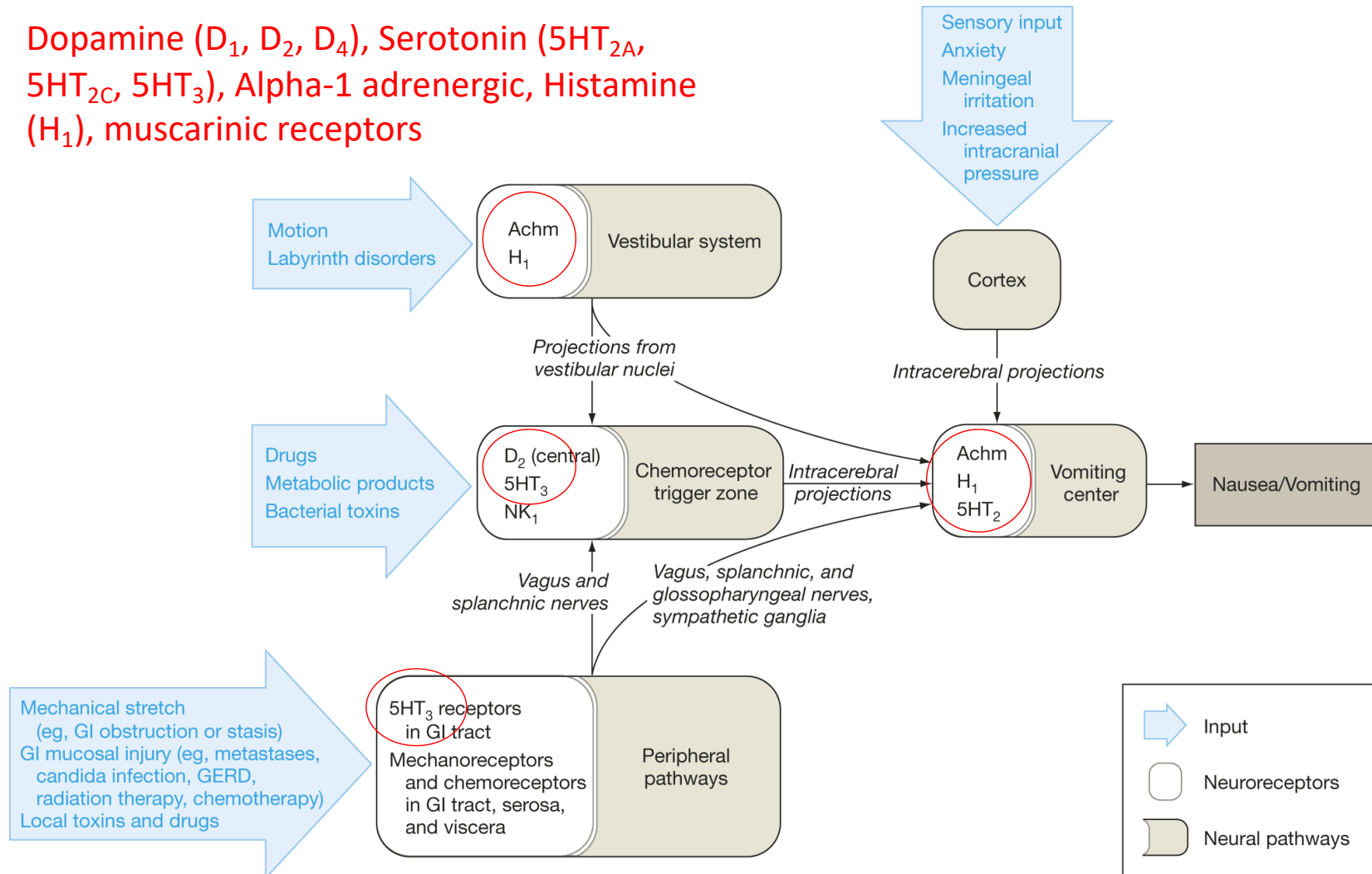
- RCT of 620 patients undergoing ambulatory laparoscopic surgery or breast augmentation
- Ondansetron + scopolamine or placebo patch
- Total response (no nausea, no vomiting/retching, and no use of rescue medication) in 24h after surgery:
 - **35% scopolamine group**
 - **25% placebo group**($P < 0.01$)
- No significant difference in the 24h or 48h post-discharge period

Transdermal Scopolamine

- Meta-analysis of 23 trials
 - 979 patients received transdermal scopolamine
 - 984 patients received placebo
- Relative risks:
 - Vomiting 0.69 (95% CI, 0.58-0.82)
 - Nausea 0.69 (95% CI, 0.54-0.87)
 - Nausea/Vomiting 0.76 (95% CI, 0.66-0.88)
- Out of 100 patients who receive transdermal scopolamine, 17 will not experience postoperative vomiting. However:
 - 18 will have visual disturbances
 - 8 will have dry mouth
 - 2 will have dizziness
 - 1 will have agitation

Olanzapine Receptor Activity

Dopamine (D_1 , D_2 , D_4), Serotonin ($5HT_{2A}$, $5HT_{2C}$, $5HT_3$), Alpha-1 adrenergic, Histamine (H_1), muscarinic receptors



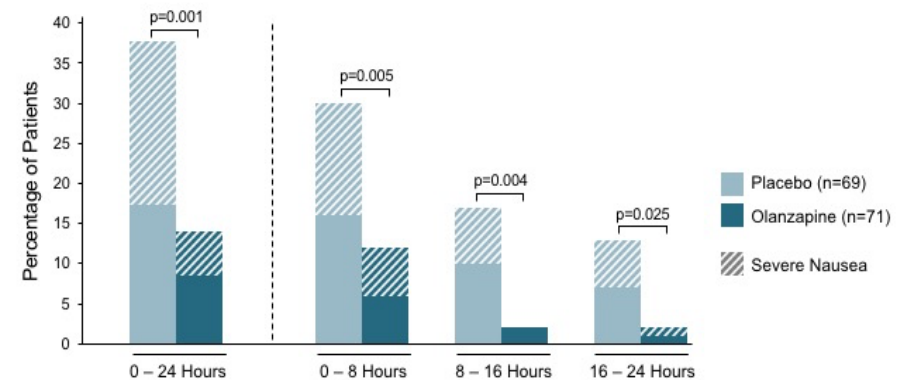
Olanzapine

- Used for Chemotherapy Induced N/V
- Peak plasma time = 6h
- $T_{1/2} = 30\text{h}$

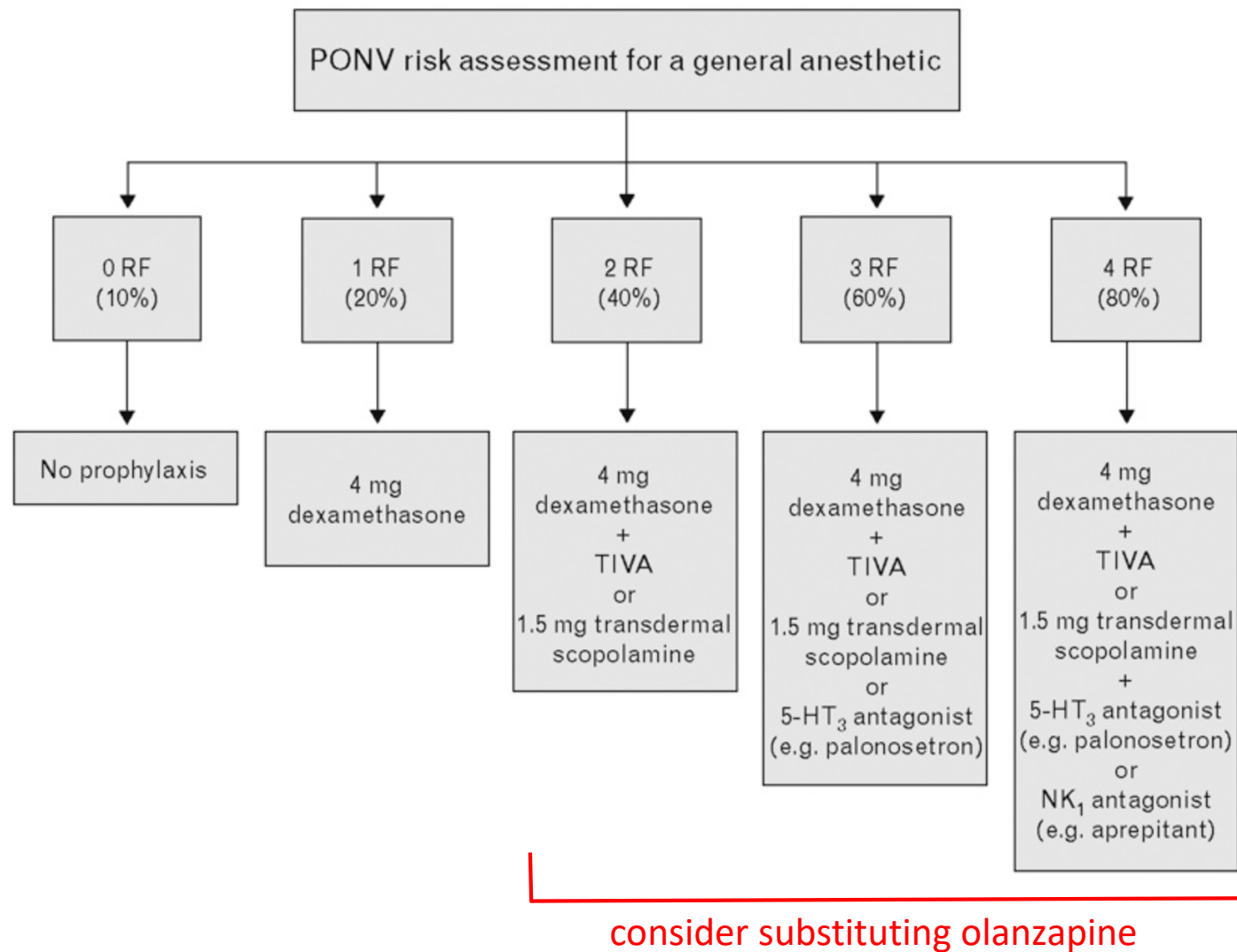


Olanzapine

- RCT of 140 patients with ≥ 2 Apfel risk factors undergoing ambulatory gyn or plastic surgery
- Dexamethasone & ondansetron + olanzapine or placebo
- **PDNV:**
 - **37% placebo group**
 - **14% olanzapine group**
 - relative risk 0.37
- Median tiredness score: 4 in placebo group, 6 in olanzapine group



Risk-Stratified PDNV Pharmacologic Prevention Plan



PDNV Prevention

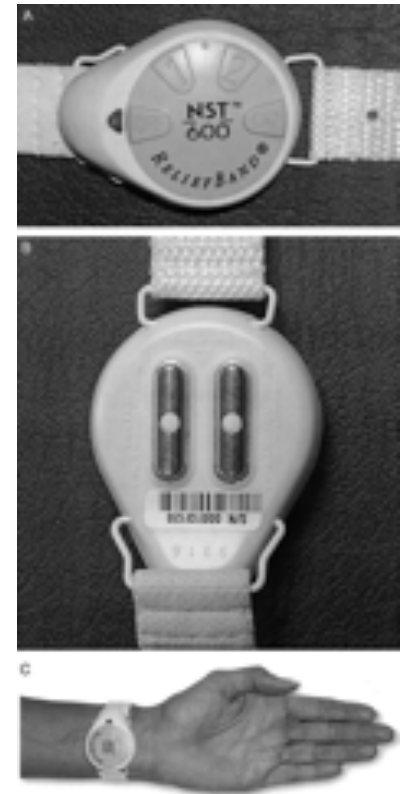
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- **Alternative techniques:**
 - **Acupuncture**
 - **Acupressure**

Acupuncture

- RCT of 81 ambulatory gyn surgery patients
- Acupuncture at PC6 point vs placebo during surgery
- No pharmacologic prophylactic antiemetics
- PONV in PACU
 - 65% placebo group
 - 35% acupuncture group
- **PDNV**
 - **69% placebo group**
 - **31% acupuncture group**

Transcutaneous Electrical Acupoint Stimulation

- RCT of 120 ambulatory plastic surgery patients
- Droperidol +
 - Ondansetron
 - Reliefband®
 - Ondansetron + Reliefband®
- Nausea incidence in 24h after surgery:
 - 50% in ondansetron group
 - 35% in Reliefband® group
 - 20% in ondansetron + Reliefband® group (significant when compared to ondansetron group)



Price Comparison PDNV Prevention Therapies

Medication	Ave Wholesale Price (U.S.) per vial or pill
Ondansetron 4mg IV Oral ODT	 \$0.56 - \$2.70 \$0.54 - \$24.89 \$22.25 - \$23.11
Palonosetron 0.25mg IV	 \$62.50 - \$489.20
Granisetron 1mg IV PO	 \$7.50 - \$ 24.00 \$59.01 - \$59.05
Aprepitant 40mg PO	 \$109.94- \$141.65
Olanzapine 10mg PO	 \$18.53 - \$19.92
Scopolamine 1.5mg Transdermal patch	 \$22.47 - \$25.56
ReliefBand® device	 \$30

Concluding Thoughts

- PDNV is an under-recognized problem
- Relatively few studies specifically evaluate the time period after discharge from ambulatory surgery
- Prevention of PDNV in high-risk patients likely requires a multimodal management approach incorporating risk reduction and therapeutic interventions

Thank you

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