

# PICU Hydromorphone and Dexmedetomidine Weaning

Disclaimer: This clinical pathway is provided as a general guideline for use by Licensed Independent Provider's (LIP) in planning care and treatment of patients. It is not intended to be and does not establish a standard of care. Each patient's care is individualized according to specific needs.

## Goals:

- To standardize sedation weaning and the treatment of opioid and Dexmedetomidine habituation at ACH PICU
- To avoid prolonged methadone and clonidine courses
- To optimize the treatment of opioid and Dexmedetomidine at ACH PICU

## Target patients:

Patients in the pediatric intensive care units who required mechanical ventilation and sedation for more than 5 days or mechanical ventilation and high doses of sedation regardless of duration.

## Target users:

- PICU attending, fellow and resident physicians
- PICU pharmacists
- PICU registered nurses

## How to use:

- Start with assessing the need for preemptive scheduled methadone and/or clonidine. Use the tables in this document to determine the need for methadone and/or clonidine and the respective optimal dose
- If the patient does not need scheduled methadone or clonidine, do not follow Steps 2-3 of this protocol. Initiate WAT-S assessment every 6 hours.
- If the patient does not need scheduled methadone or clonidine, do not follow Step 2-3 of this protocol. Initiate WAT-S every 6 hours. Add PRN Clonidine (0.002 mg/kg every 8 hours ) for WAT-S > 4
- If scheduled methadone and clonidine is needed, then:
  - a. If extubation is expected during the next shift or day, start with step 2
  - b. If extubation is expected within the hours, skip step 2 and start with step 3
- Once extubated and done with step 3, use step 4 for weaning on methadone and clonidine

# Step 1: Conversion Tables

**Hydromorphone (opioid):** Calculate 24 hour opioid intake, including bolus doses. Divide total opioid intake by 24 hours to obtain an estimated hourly per kg dose for conversion

<u>Time on Opioid</u>	<u>Dilaudid (mcg/kg/hr)</u>	<u>Fentanyl (mcg/kg/hr)</u>	<u>Morphine (mg/kg/hr)</u>	<u>Methadone (mg/kg/dose) Max 10mg/dose</u>	<u>Risk Level</u>
< 5 days	0 – 20	0 – 1	0 – 100	No Methadone	Low
	20 – 30	1 – 2	100 – 200		
	> 30	> 2	> 200		
5 – 7 days	0 – 5	0 – 0.3	0 – 30	No Methadone	Low
	5 – 10	0.3 – 0.7	30 – 70		
	10 – 15	0.7 – 1	70 – 100	0.08	Moderate
	15 – 20	1 – 1.3	100 – 130	0.1	
	20 – 30	1.3 – 2	130 – 200	0.15	High
	30 – 35	2 – 2.3	200 – 230	0.2	Very High
	35 – 40	2.3 – 2.7	230 – 270	0.25	
> 40	> 2.7	> 270	0.3		
8 – 14 days	0 – 5	0 – 0.3	0 – 30	No Methadone	Low
	5 – 10	0.3 – 0.7	30 – 70	0.08	Moderate
	10 – 15	0.7 – 1	70 – 100	0.1	
	15 – 20	1 – 1.3	100 – 130	0.15	High
	20 – 30	1.3 – 2	130 – 200	0.2	Very High
	30 – 35	2 – 2.3	200 – 230	0.25	
	> 35	> 2.3	> 230	0.3	
15 – 21 days	5 – 10	0.3 – 0.7	30 – 70	0.1	High
	10 – 15	0.7 – 1	70 – 100	0.15	Very High
	15 – 20	1 – 1.3	100 – 130	0.2	
	20 – 30	1.3 – 2	130 – 200	0.25	
	> 30	> 2	> 200	0.3	
>21 days	10 – 15	0.7 – 1	70 – 100	0.15	High
	15 – 20	1 – 1.3	100 – 130	0.2	Very High
	20 – 25	1.3 – 1.5	130 – 150	0.25	
	> 25	> 1.5	> 150	0.3	

## Dexmedetomidine

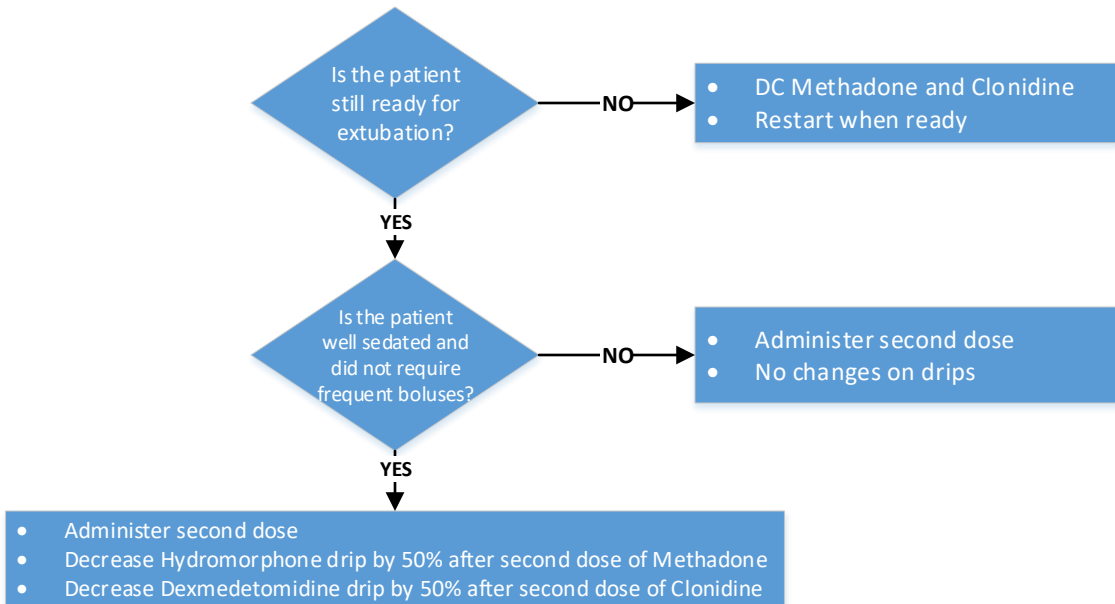
<u>Time on Dexmedetomidine</u>	<u>Dexmedetomidine Dose (mcg/kg/hr)</u>	<u>Enteral Clonidine (mcg/kg/dose)</u>
< 5 days	0 – 1	No Clonidine
	1 – 2	
	> 2	
5 – 7 days	0 – 2	No Clonidine
	> 2	1
8 – 14 days	0 – 0.5	1.5
	0.6 – 0.9	2.5
	1 – 1.5	3.5
	> 1.5	4
15 – 21 days	< 0.5	2
	0.5 – 0.9	3
	1 – 1.5	4
	> 1.5	5
> 21 days	0 – 0.5	2
	0.6 – 0.9	3.5
	> 1	5

# Step 2: Methadone and Clonidine Initiation

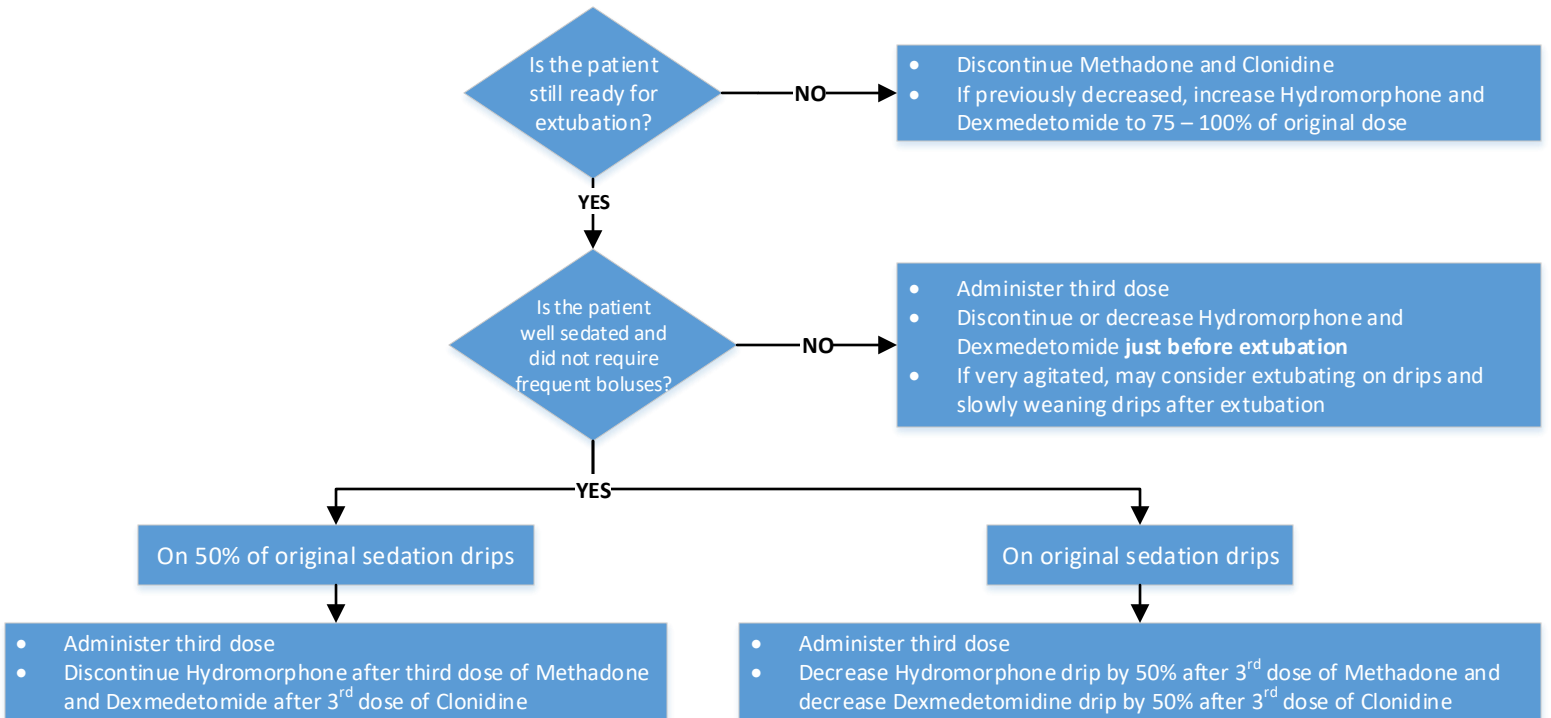
Initiate pathway  
6 – 12 hours before  
anticipated  
extubation

- Patients on very high doses or very long course of sedatives might benefit from methadone and clonidine initiation 12 – 24 hours before extubation
- Obtain baseline WAT-S then schedule Q6 hours
- Start Methadone Q6 hours (use [Conversation Tables](#))
- Start Clonidine Q6 hours (use [Conversation Tables](#), start 3 hours after methadone)

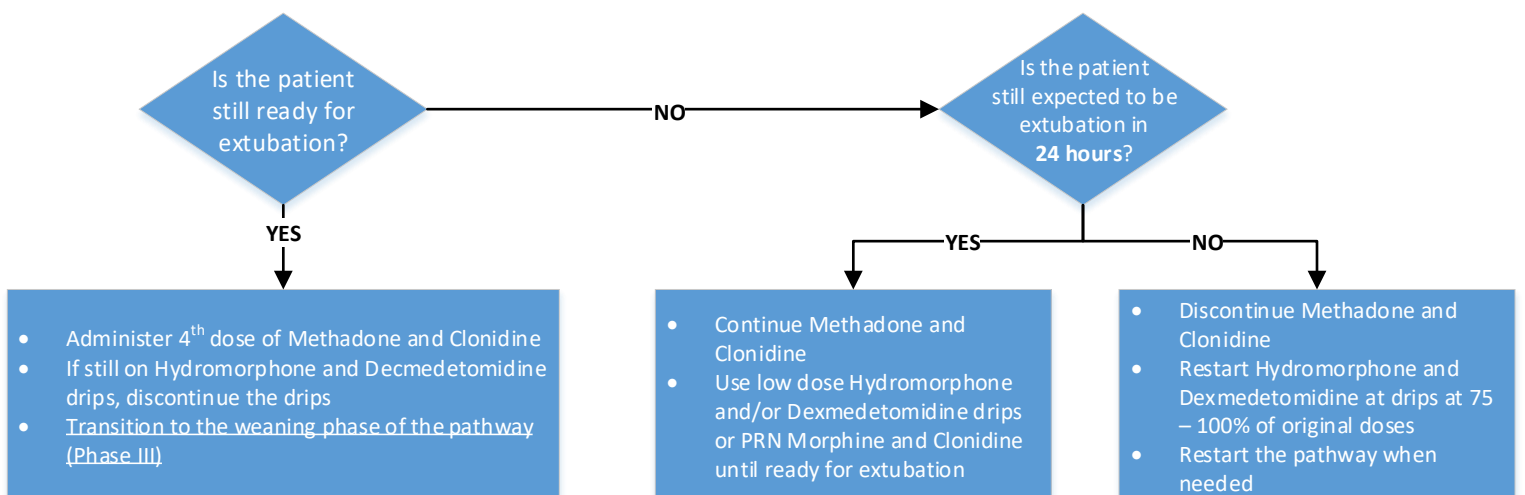
## Second Dose



## Third Dose

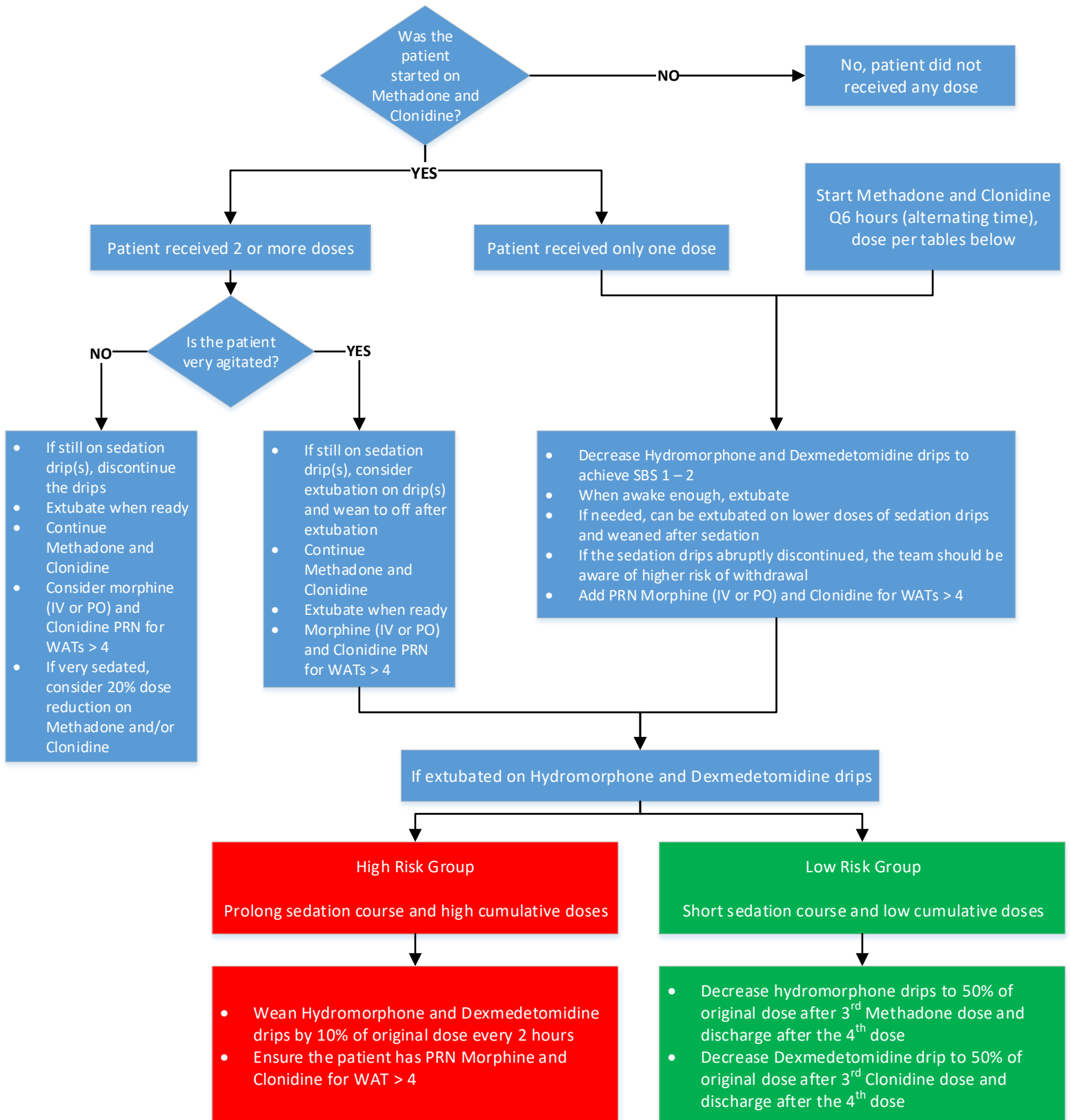


## Fourth Dose



# Step 3: Extubation

- When the patient is ready for extubation, follow this phase of the sedation weaning pathway **regardless** if the patient was started on the initiation phase
- Remember:** While preventing withdrawal is important, early and timely liberation from mechanical ventilation is also very important. Extubation should not be delayed to another day simply to give methadone and clonidine time to reach steady levels



## Step 4: Methadone and Clonidine Weaning

### Low Risk

- After 4 WAT scores have been reported < 4, space Methadone from every 6 hours to every 12 hours
- After 3 doses of Clonidine, space Clonidine to every 12 hours, alternating with Methadone
- If no withdrawal after Q12 Clonidine dosing for 2 doses, wean Methadone to Q24 hours and then place stop date for Methadone
- After Methadone order placed for Q24, wean Q12 clonidine by 50% for 2 doses and then place stop date for Clonidine

### Moderate Risk

- After 4 WAT scores < 4, space Q6 Methadone and Clonidine, to Q8 to alternate every 4 hours
- After 3 doses of new Clonidine dose, space methadone to Q12
- After Q12 Methadone dosing for 2 doses with no withdrawal, space Methadone to Q24 and then place stop date for 2 doses of Q24
- After Q24 Methadone dosing for 1 dose with no withdrawal, space Clonidine to Q12 alternating with Methadone

### High and Very High Risk

- After 24 hours of no rescue medications, space Q6 Methadone and Clonidine, to Q8 to alternate every 4 hours
- After 24 hours of no rescue medications, decrease Clonidine dosing by 20% of original dose
- After 24 hours of no rescue medications given, space Methadone to Q12
- After 24 hours of no rescue medications, decrease Clonidine dosing by 20% of original dose
- After 24 hours of no rescue medications, decrease Methadone dosing by 20% of original dose
- After 24 hours of no rescue medications, decrease Clonidine dosing by 20% of original dose
- After 24 hours of no rescue medications, decrease Methadone dosing by 20% of original dose
- After 24 hours of no rescue medications, space Clonidine to Q12 to alternate with Methadone
- After 24 hours of no rescue medications, decrease Methadone dosing by 20% of original dose to Q24 dosing
- After 24 hours of no rescue medications, decrease Clonidine to Q24 to alternate with Methadone

[Step II Pathway](#)

[Step III Pathway](#)

[Step IV Pathway](#)

## Metrics

1. Time to discontinuation of methadone
2. Frequency of breakthrough withdrawal
3. Nurses' satisfaction with the pathway
4. Frequency of Side effects: apnea, hypoxia, and hypotension

[Step II Pathway](#)

[Step III Pathway](#)

[Step IV Pathway](#)

## Contributing Members

Salim Aljabari MD – Pediatric Critical Care  
Katherine Irby MD – Pediatric Critical Care  
Clint Lays, PharmD – Pharmacy  
Emily Rader, RN – Clinical Effectiveness and Outcomes  
Sophia Blythe, MHA – Clinical Effectiveness and Outcomes

## References

Solodiuk JC, Greco CD, O'Donnell KA, Morrill DR, Curley MAQ. Effect of a Sedation Weaning Protocol on Safety and Medication Use among Hospitalized Children Post Critical Illness. *J Pediatr Nurs*. 2019 Nov-Dec;49:18-23. doi: 10.1016/j.pedn.2019.08.001. Epub 2019 Aug 27. PMID: 31470315.

Siddappa R, Fletcher JE, Heard AM, Kielma D, Cimino M, Heard CM. Methadone dosage for prevention of opioid withdrawal in children. *Paediatr Anaesth*. 2003 Nov;13(9):805-10. doi: 10.1046/j.1460-9592.2003.01153.x. PMID: 14617122.

Tobias JD. Subcutaneous administration of fentanyl and midazolam to prevent withdrawal after prolonged sedation in children. *Crit Care Med*. 1999 Oct;27(10):2262-5. doi: 10.1097/00003246-199910000-00033. PMID: 10548218.