remifentanil (re-mi-fen-ta-nil)
(Ultra)

Classification
Therapeutic: opioid analgesics
Pharmacologic: opioid agonists

Schedule II
Pregnancy Category: C

Indications
Supplement in anesthesia. Decrease analgesia. Opioid antagonists; reduced pain.

Action
Binds to opiate receptors in the CNS, altering the response to and perception of pain.

Primary Mechanism of Action: Opioid agonist.

Pharmacokinetics
Absorption: IV administration results in complete bioavailability.
Distribution: Widely distributed.
Metabolism and Excretion: Metabolized by blood and tissue esterases, metabolites are excreted by the kidneys.
Half-life: 3–10 min.

TIME/ACTION PROFILE (analgesia†)

<table>
<thead>
<tr>
<th>ROUTE</th>
<th>ONSET</th>
<th>PEAK</th>
<th>DURATION</th>
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<tbody>
<tr>
<td>IV</td>
<td>rapid</td>
<td>3–5 min</td>
<td>5–10 min</td>
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†Respiratory depression may last longer than analgesia

Contraindications/Precautions
Contraindicated in: Hypersensitivity; cross-sensitivity with other opioid agonists; patients who have received MAO inhibitors within the previous 14 days (may produce unpredictable, potentially fatal reactions).

Use Cautiously in: Geriatric, delirium, sedated patients; starting dose of remifentanil by 50% in patients >65 yr.

Adverse Reactions/Side Effects
CNS: confusion, paradoxical excitation/delirium, postoperative depression, postoperative drowsiness.
EENT: blurred/double vision.
Resp: allergic bronchospasm, respiratory depression.
CV: circulatory depression, hypotension.
GI: biliary spasm, nausea/vomiting.
Derm: facial itching.
MS: skeletal and thoracic muscle rigidity, shivering.

Interactions
Drug-Drug: Avoid use in patients who have received MAO inhibitors within the previous 14 days (may produce unpredictable, potentially fatal reactions). CNS and respiratory depression with other CNS depressants, including alcohol, antihistamines, antidepressants, other sedative/hypnotics, and other opioids. Risk of hypotension with benzodiazepines.
Nalbuphine, buprenorphine, or pentazocine may potentiate analgesia.

Route/Dosage
Induction of Anesthesia
IV (Adults): 0.5–1 mcg/kg/min continuous infusion (an initial dose of 1 mcg/kg may be given over 30–60 sec).

Maintenance of Anesthesia
IV (Adults): With nitrous oxide 66%—0.4 mcg/kg/min (range 0.1–2 mcg/kg/min); with isoflurane (0.4–1.5 MAC)—0.25 mcg/kg/min (range 0.05–2 mcg/kg/min). Supplemental bolus doses of 1 mcg/kg may be given.

IV (Children 1–12 yr): With halothane 0.3–1.5 MAC, sevoflurane 0.3–1.5 MAC or isoflurane 0.4–1.5 MAC—0.25 mcg/kg/min (range 0.05–2 mcg/kg/min). Supplemental bolus doses of 1 mcg/kg may be given.

OB, Lactation, Pedi: Pregnancy, lactation, and children <2 yr (safety not established in younger age groups for some agents).

Use with Ultrasafe: Use Cautiously in: Geriatric, delirium, sedated patients; starting dose of remifentanil by 50% in patients >65 yr.
Continuation as an Analgesic in Immediately Postoperative Period

**IV (Infants birth-2 mo):** With nitrous oxide 70%—0.4 mcg/kg/min (range 0.4–1 mcg/kg/min); supplemental doses of 1 mcg/kg may be given.

**Continued**

**Monitored Anesthesia Care (Remifentanil Alone)**

**IV (Adults):** Single IV dose—1 mcg/kg given 90 sec before local anesthetic or continuous infusion—0.1 mcg/kg/min beginning 5 min before local anesthetic, then 0.05 mcg/kg/min after local anesthetic (range 0.025–0.2 mcg/kg/min).

**Monitored Anesthesia Care (Remifentanil + Midazolam)**

**IV (Adults) 2 yr:** Single IV dose—0.5 mcg/kg given 90 sec before local anesthetic or continuous infusion—0.05 mcg/kg/min beginning 5 min before local anesthetic, then 0.025 mcg/kg/min after local anesthetic (range 0.025–0.2 mcg/kg/min).

**Coronary Artery Bypass Surgery**

**IV (Adults):** Induction and maintenance of anesthesia—1 mcg/kg/min (range for maintenance 0.125–4 mcg/kg/min; continuation as an analgesic into ICU—1 mcg/kg/min (range 0.05–1 mcg/kg/min).

**NURSING IMPLICATIONS**

**Assessment**

- Monitor respiratory rate and BP frequently during therapy. Report significant changes immediately. The respiratory depressant effects of remifentanil may last longer than the analgesic effects. Reduce initial doses of other opioids by 1/4-1/3 of the usually recommended dose.
- Monitor closely.
- Monitor respiratory rate and BP frequently during therapy.
- Type, location, and intensity of pain before and 3–5 min after administration when used to treat pain.

**Lab Test Considerations:** May cause serum amylase and lipase concentrations.

**Toxicity and Overdose:**
- Symptoms of toxicity include respiratory depression, hypotension, arrhythmias, bradycardia, and asystole. Atropine may be used to treat bradycardia. If respiratory depression persists after surgery, prolonged mechanical ventilation may be required. If an opioid antagonist is required to reverse respiratory depression or coma, naloxone (Narcan) is the antidote. Dilute the 0.4-mg ampule of naloxone in 10 mL of 0.9% NaCl and administer 0.5 mL (0.02 mg) by direct IV push every 2 min. For children and patients weighing <40 kg, dilute 0.2 mg of naloxone in 10 mL of 0.9% NaCl for a concentration of 10 mcg/mL and administer 0.5 mcg/kg every 2 min. Titrate dose to avoid withdrawal, seizures, and severe pain. Administration of naloxone in these circumstances, especially in cardiac patients, has resulted in hypotension and tachycardia, occasionally causing left ventricular failure and pulmonary edema.

**Potential Nursing Diagnoses**

- Acute pain (Indications)
- Ineffective breathing pattern (Adverse Reactions)
- Risk for injury (Side Effects)

**Implementation**

- High Alert: Accidental overdose of opioid analgesics has resulted in fatalities. Before administering, clarify all ambiguous orders; have second practitioner independently check original order, dose calculations, and infusion pump settings.
- High Alert: Opioid antagonists may be administered before or after administration to reduce the induction dose requirements, decrease the time to loss of consciousness, and reduce amnesia. This combination may also increase the risk of hypotension.
- High Alert: Neuraxial and continuous opioid infusions should be readily available during the administration of remifentanil. Remifentanil (0.5–1 mcg/kg/min) is usually coadministered with nonopioid analgesics (e.g., ketamine) to enhance the analgesic effect of remifentanil. Remifentanil should not be administered as a continuous infusion without the use of a continuous infusion controller. Remifentanil should be administered only by personnel trained in resuscitation and emergency airway management.

**IV Administration**

- **Direct IV:** Administer slowly over 1–3 min. Slow IV administration may reduce the incidence and severity of muscle rigidity, bradycardia, or hypotension. Neuromuscular blocking agents may be administered concurrently to decrease muscle rigidity.

- **Intermittent Infusion:** High Alert: Use infusion controller for intermittent administration. Diluent: May be diluted in sterile water. DMW: D5W 0.9% NaCl 0.9%
remifentanil

NaCl, or 0.45% NaCl. Concentration: May be 20–250 mcg/mL depending on amount of diluent. Route: For induction of anesthesia administer at a rate of 0.5 to 1 mcg/kg/min. Stronger in lower range for maintenance of anesthesia.

**System Compatibility**: propofol.

**Y-Site Compatibility**: acyclovir, alfentanil, amikacin, aminoacyctine acid, amipriline, ampicillin/sulbactum, amiodarone, atenolol, bevacizumab, bevuixin, buprenorphine, bupivacaine, calcium gluconate, carboplatin, cephalosporin, ceftriaxone, chlorpromazine, colchicine, colcacin, colistin, colistimethate, cyclophosphamide, cyclosporine, cyclosporine, daunorubicin, diazepam, diethylaminoethyl, epirubicin, epinephrine, epinephrine, esmolol, etoposide, etoposide, famotidine, fenoldopam, fentanyl, fluconazole, fludarabine, fluorouracil, furosemide, ganciclovir, gemcitabine, gentamicin, granisetron, haloperidol, heparin, hydrocortisone, hydromorphone, idarubicin, ifosfamide, imipenem-cilastatin, irinotecan, isoproterenol, ketorolac, levofloxacin, lidocaine, linezolid, lorazepam, magnesium sulfate, mannitol, mechlorethamine, meperidine, methotrexate, methylprednisolone, metoclopramide, metronidazole, midazolam, milrinone, minocycline, mitoxantrone, morphine, mycophenolate, nalbuphine, nesiritide, nitroglycerin, norepinephrine, octreotide, ondansetron, paclitaxel, palonosetron, pamidronate, pancuronium, pantoprazole, phenylephrine, piperacillin/tazobactum, pirenidone, piroxicam, propranolol, promethazine, ranitidine, vecuronium, vincristine, voriconazole, zidovudine, zoledronic acid.

**Y-Site Incompatibility**: amphotericin B cholesteryl sulfate, amphotericin B lipid complex, daptomycin, gemtuzumab, oxytocin, pantoprazole, propofol.

**Patient/Family Teaching**

- Discuss the use of anesthetic agents and the sensations to expect with the patient before surgery.
- Explain pain assessment scale to patient.
- Caution patient to change positions slowly to minimize orthostatic hypotension.
- Medication causes dizziness and drowsiness. Advise patient to call for assistance during ambulation and transfer and to avoid driving or other activities requiring alertness for 24 hr after administration during outpatient surgery.
- Instruct patient to avoid alcohol or other CNS depressants for 24 hr after administration for outpatient surgery.

**Evaluation/Desired Outcomes**

- General quiescence.
- Reduced motor activity.
- Pronounced analgesia.

Why was this drug prescribed for your patient?