

## Drugs In Sport & MSK Medicine



### Management of Pain & Inflammation

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[www.puresportsmed.com](http://www.puresportsmed.com)

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## Overview



1. Know the classes of analgaesics and non-steroidal anti-inflammatories commonly used in sporting injuries and other MSK problems
2. Understand their mechanisms of action, indications and contra-indications
3. Be aware of their side effects
4. Understand the role of neuromodulators in pain management

#### Discussion:

Can prescriptions medications be administered drugs in the absence of the team doctor?  
Should physios advise about taking OTC medications?

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## Drug Classes For Pain & Inflammation



- Analgaesics
  - Simple
    - e.g. paracetamol
  - Weak opioids
    - e.g. codeine, dihydrocodeine, tramadol,
  - Strong opioids
    - e.g. morphine, oxycodone
- (Compound preparations)
- Non steroidal anti-inflammatories (nsaids)
  - Aspirin
  - Non-selective nsaids
    - e.g. ibuprofen, diclofenac
  - Cox<sub>2</sub> inhibitors
    - e.g. arcoxia, celebrex



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## Simple Analgaesics



- Paracetamol (acetaminophen)
  - Analgaesic
  - Antipyretic
- Mechanism of action
  - ??
  - Weak inhibition of prostaglandin synthesis (*COX-2 & 3 pathways*)
  - Central effects
    - Activation of descending serotonergic pathways
- Side effects – nil significant

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## Opiods



- Weak e.g. codeine, dihydrocodeine, tramadol,
- Strong eg morphine, diamorphine, oxycodone
- Mechanisms of action
  - Act on opioid receptors in primary afferent sensory neurons, spinal cord, brain
  - Inhibition of neurotransmitter release & activation of descending inhibitory pathways



"I suggest you take these on an empty stomach."

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## Opiods - Considerations



- Tolerance
  - Higher doses of opioids are required to produce an effect
  - Due to receptor desensitisation
- Dependence
  - Usually accompanied by tolerance
  - Masked until the opioid drug is removed from its receptors
  - Withdrawal response
    - Dysphoria, sweating, nausea, rhinorea, fatigue, vomiting, pain
- Addiction
  - Physical and/or psychological
  - Rare if taking doses appropriate to pain levels

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## Opioids – Side Effects



- Nausea & vomiting
- Drowsiness
- Itching
- Constipation
- Dry mouth
- (Confusion, hallucinations)



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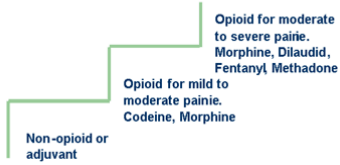
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## The Pain Ladder



### WHO Analgesia Ladder



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## Common Combinations



- Co-codamol (paracetamol + codeine)
- Co-dydramol (paracetamol + dyhydrocodeine)
- Co-proxamol (paracetamol + dextropropoxyphene)

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## OTC vs POM



Over The Counter (OTC)	Prescription Only Medication (POM)
Paracetamol Cocdamol (weaker version)	Codeine Tramadol Oxycodone



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## Case Scenario



- 42-year old female with knee pain
- Loss of articular cartilage secondary to 2 x previous lateral subtotal meniscectomies
  - Occasional swelling
  - Aches
  - Difficult to exercise



What would you use?

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## Analgaesic 'Rebound' Headache



- Frequent or excessive use of analgaesics worsens HA
- Worsening of HA as analgaesic wears off
- 'Tension-type'
- Occurs with OTC medication
- Treatment
  - (Gradual) withdrawal of analgaesic



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## NSAIDs



- Salicylates
  - e.g. aspirin
- Non selective nsaid
  - e.g. ibuprofen (nurofen), diclofenac (voltarol), indomethacin
- Cox<sub>2</sub> inhibitors
  - e.g. etorocoxib (arcoxia), celecoxib (celebrex)

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## Aspirin



- ASA (acetyl salicylic acid)
- MOA
  - Suppresses production of prostaglandins
- Effects
  - Analgaesic
  - Anti-inflammatory
  - Anti-pyretic
  - Anti-platelet



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## Aspirin – Use In Sports Injuries



- Not commonly prescribed
  - Some patients 'choose' it as their first line painkiller
- Large side effect profile because of wide range of effects
  - Increased risk of bleeding
  - Gastritis/peptic ulcers

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## Cyclo-Oxygenase (COX)



- COX= enzyme responsible for formation of prostanoids (inc prostaglandin & thromboxane)
- Isoenzymes
  - COX<sub>1</sub>
    - Present in most cells (constitutive)
    - Gastric mucosa protection, reduces platelet aggregation, reduces peripheral vascular resistance,
  - COX<sub>2</sub>
    - Induced in states of inflammation
    - Pro-inflammatory actions
  - COX<sub>3</sub>
    - Recently discovered

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## Non-Selective NSAIDs



- Act on both COX<sub>1</sub> and COX<sub>2</sub> receptors
  - e.g. ibuprofen, diclofenac
- Effects
  - Inhibition of prostaglandin & thromboxane
  - Reduced inflammation (pain) as well as antipyretic, antithrombotic and analgesic effects
- Side effects
  - Irritation of gastric mucosa
    - Inhibition of prostaglandin synthesis which has a protective role on the GIT

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## Non Selective NSAIDs - Variation



- Ibuprofen least GI side effects
  - Shortest half-life
- Indomethacin greater inhibition of prostaglandin
  - Use in inflammatory arthritis
  - Worse side effect profile
- Diclofenac usually produces greater anti-inflammatory/analgesic action than ibuprofen



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## COX<sub>2</sub> Inhibitors



- Selective action on COX<sub>2</sub> receptors
  - e.g. etorocoxib (arcoxia), celecoxib (celebrex)
- Effects
  - Reduction of inflammation (pain)
- Side effects
  - Less gastric irritation as COX<sub>2</sub> specific to inflamed tissue



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## COX<sub>1</sub> & COX<sub>2</sub> Inhibitors: Side Effects



- Renal failure
  - Reduction in blood flow to kidneys
- HT
  - Due to role of prostaglandin regulation of BP in the kidneys
- Cardiovascular e.g. heart attack, thrombosis, stroke
  - Due to increase in thromboxane
  - Risk appears to be greater with COX<sub>2</sub> inhibitors
- *Rofecoxib (Vioxx) banned because appears to have even greater risk*

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## Which, When?



- Not tolerate non-selective nsaid
- Non-selective nsaid ineffective
- Cost
- Dosing
  - Slow release preparations e.g. diclofenac
- Method of delivery
  - PO or topical
- Bony injury
  - May affect bony healing
  - Relies on inflammation & prostaglandins

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### Case Scenario 1



- Ankle joint synovitis post inversion injury

What would you use?



*NB ligament healing*

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### Case Scenario 2



- Grade 2 hamstring strain



What would you use?

- ?excessive bleeding/reduction in tissue healing
- ?regulate unwanted excessive anti-inflammatory action

*Mehallo 2006, Practical Management: NSAID Use in Athletic Injuries, Clin J Sports Med, Volume 16(2), March 2006, pp 170-174*

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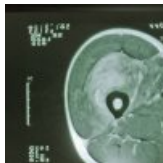
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### Case Scenario 3



- Quads haematoma

What would you use?



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## 'Loading'



- Need 48-72hrs (or longer) of full regular dose to build up to maximum effect
- Can combine analgaesics with nsaid
- If the situation is (time) critical
  - Start high and drop down to lowest effective dose

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## Neuromodulators



- Alter pain processing pathways
- e.g. amitriptyline, gabapentin, pregabalin



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## Indications



- Component of centrally driven pain
- Moderate to severe nerve root pain

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## Side Effects



Drug	Side Effects
Amitriptyline	Drowsiness, constipation, dry mouth, dizziness, postural hypotension
Gabapentin	Drowsiness
Pregabalin	Drowsiness

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## Using Neuromodulators



- Gradually build up dose
  - e.g. gabapentin
    - Day 1: 300mg day 1
    - Day 2: 300mg BD
    - Day 3 onwards: 300mg TDS
- Combined with other drugs

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## Case Scenario



- LBP + R leg pain
  - Acute PID

What would you use?



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## Opioid-Sensitive Chronic Pain



- Some centrally-driven is opioid-sensitive
- Does not respond to neuromodulators
- Trial of opioid
  - e.g. oxycodone

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## Questions?



"It's my knee, Doctor. It's still giving me problems."

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## Discussion



The role of physiotherapists in giving out medication in the absence of the team doctor

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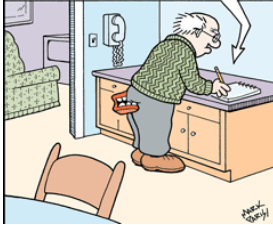
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Thank You!



1. CALL DENTIST ABOUT MISSING DENTURES.
2. CALL DOCTOR ABOUT EMBARRASSING NEW DISCOMFORT.



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