



Western Health

phn
NORTH WESTERN
MELBOURNE
An Australian Government Initiative

Metabolic Bone masterclass

Tuesday 15 September 2026

The content in this session is valid at date of presentation



Acknowledgement of Country

North Western Melbourne Primary Health Network would like to acknowledge the Traditional Custodians of the land on which our work takes place, the Wurundjeri Woi Wurrung People, the Boon Wurrung People and the Wathaurong People.

We pay respects to Elders past, present and emerging as well as pay respects to any Aboriginal and Torres Strait Islander people in the session with us today.



Housekeeping – Zoom webinar



All attendees are muted



Please ask questions via the Q&A box only

- Q&A will be at the end of the presentation
- Questions will be asked anonymously to protect your privacy



This session is being recorded.

You will receive a link to this recording and copy of slides in post session correspondence.

Type your questions in the Q&A box.

Q&A

Chat Q&A

Welcome to Q&A

Questions you ask will show up here. Only host and panelists will be able to see all questions.

Type your question here...

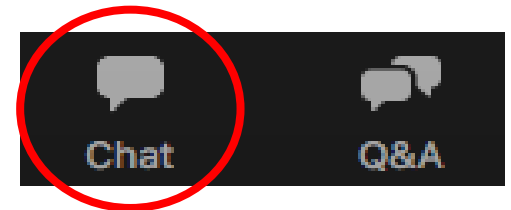
☒ Send anonymously Cancel Send

Housekeeping – Zoom webinar

Is your session name the same as your registration?

To ensure we can issue your certificates and CPD please ensure you have joined the session using the same name as your event registration (or phone number, if you have dialled in).

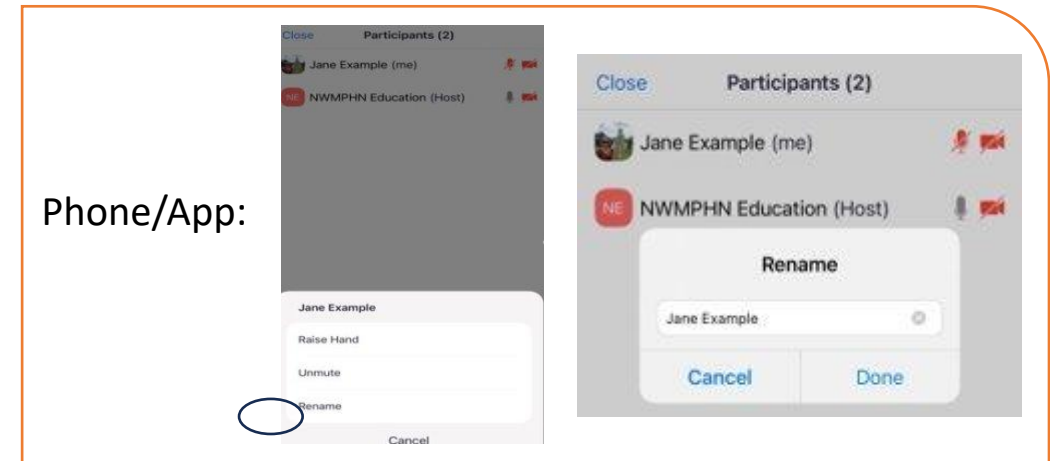
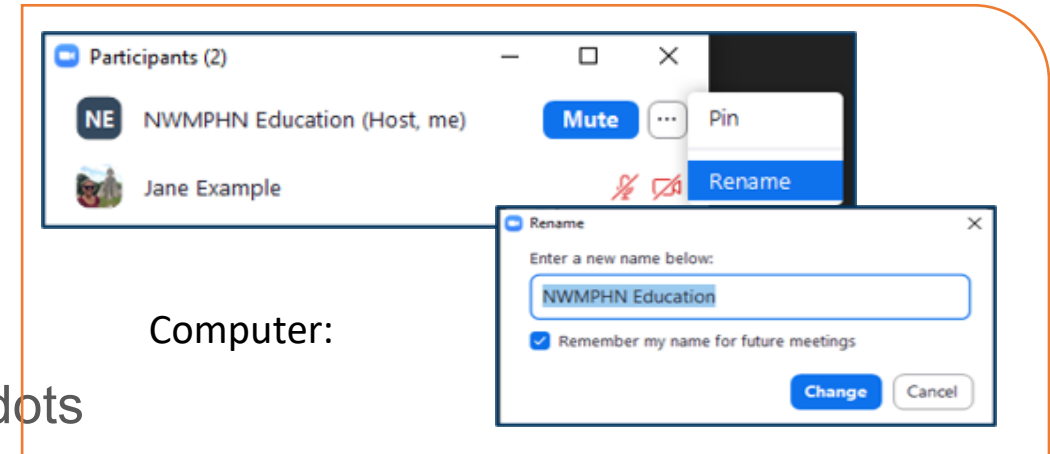
Not sure if your name matches, send a Chat message to 'NWMPHN Education' to identify yourself.



Housekeeping – Zoom webinar

How to rename yourself

1. Click on **Participants**
2. If using
 - App: click on your name
 - Computer: hover over your name and click the 3 dots
 - Mac: hover over your name and click More
3. Click on **Rename**
4. Enter the name you registered with and click **Done / Change / Rename**





Welcome to HealthPathways Melbourne



HealthPathways : Clinical Management and Referral Resource



Localised Clinical Pathways

(Evidence-based guidance adapted for Melbourne clinicians)



Referral Information

(Clear referral instructions for local health services and hospitals)



Regular Updates

(Pathways reviewed and updated regularly by Clinical Editors)



CPD Hours

(Track and record CPD activities directly through Pathway page)



Collaborative Development

(Created by GPs, specialists, allied health and other health professionals)



Easy Access

(Web-based platform, mobile-friendly for point-of-care use)



Streamlined Workflow

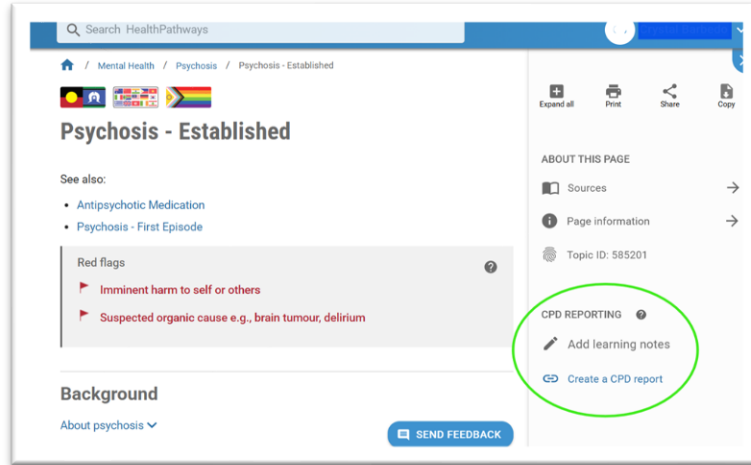
(Quick navigation with Assessment, Management and Referral sections all in one place)



Free for Clinicians

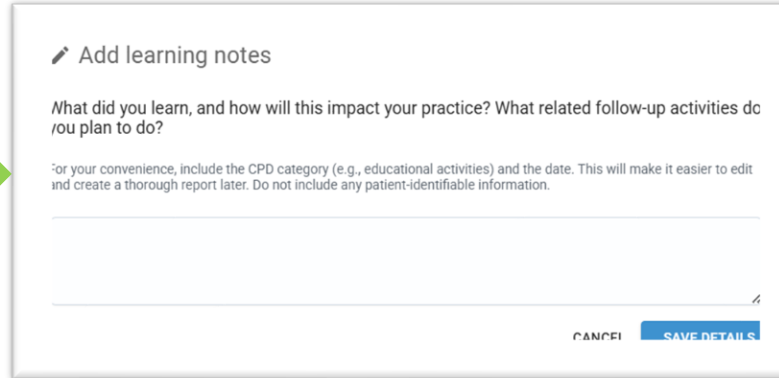
(No cost access for all health professionals in North Western and Eastern Melbourne PHN catchments)

Record Your CPD Today: Start with HealthPathways



Step 1: Access a Pathway Page

- Navigate to a clinical pathway (e.g., *Psychosis – Established*).
- Click “**Add learning notes**” or “**Create a CPD report**” to begin tracking your CPD activity.



Add learning notes

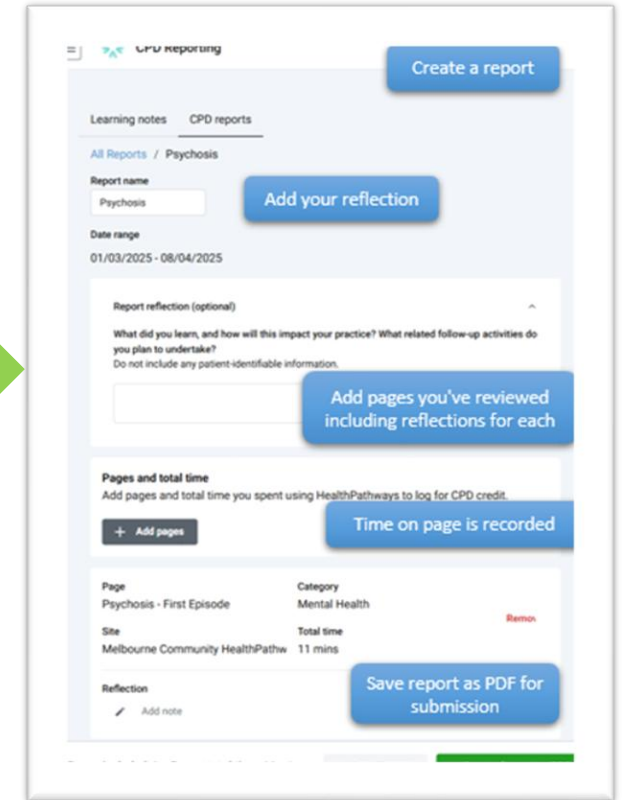
What did you learn, and how will this impact your practice? What related follow-up activities do you plan to do?

For your convenience, include the CPD category (e.g., educational activities) and the date. This will make it easier to edit and create a thorough report later. Do not include any patient-identifiable information.

CANCEL SAVE DETAILS

Step 2: Add Learning Notes

- Reflect on what you learned and how it will impact your practice.
- Include any planned follow-up activities.
- These notes are saved to your CPD record.



CPD reporting

Create a report

Learning notes CPD reports

All Reports / Psychosis

Report name: Psychosis **Add your reflection**

Date range: 01/03/2025 - 08/04/2025

Report reflection (optional)

What did you learn, and how will this impact your practice? What related follow-up activities do you plan to undertake? Do not include any patient-identifiable information.

Add pages you've reviewed including reflections for each

Pages and total time

Add pages and total time you spent using HealthPathways to log for CPD credit.

+ Add pages **Time on page is recorded**

Page	Category
Psychosis - First Episode	Mental Health
Site: Melbourne Community HealthPathway	Total time: 11 mins

Reflection: **Add note**

Save report as PDF for submission

Step 3: Generate Your CPD Report

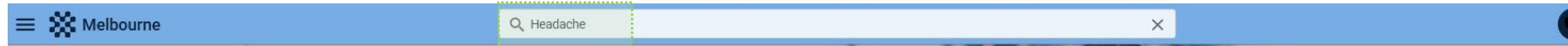
- Go to the **CPD Reporting** section.
- Add reflections, review pages, and confirm time spent.
- Export your report as a **PDF for submission**.

For further information on the CPD reporting tool, please see these videos:

- [How to create a CPD report](#)
- [How to add learning notes](#)

HealthPathways Melbourne Homepage

Search bar for quickly locating clinical pathways and conditions



Community HealthPathways

Melbourne

Medical

Assault or Abuse

Cardiology

Dermatology

Diabetes

Endocrinology

Gastroenterology

General Medicine

Genetics

Haematology

Hyperbaric Medicine

Immunology

Infectious Diseases

Intellectual Disability

Nephrology

Neurology

Bell's Palsy

Epilepsy in Adults

First Seizure in Adults

Headaches in Adults

Motor Neurone Disease

Multiple Sclerosis (MS)

Neurofibromatosis

Parkinson's Disease

Peripheral Neuropathy

Postherpetic Neuralgia (PHN)

Communicating with Patients with a



Melbourne

HEALTHPATHWAYS

Latest News

16 January

Health.vic

Health alerts and advisories

16 January

TGA alerts

TGA alerts:

- Safety Alerts (for health professionals)
- Recall Actions (for health professionals)
- TGA Medicine Shortages (for health professionals)

16 January

Measles case

A new measles case has been reported in Victoria in a traveller returning from overseas. [Read more...](#)

8 December

Nicorandil Shortage – Serious Scarcity Substitution Instrument (SSSI) in Place

The TGA has issued an SSSI to manage intermittent shortages of nicorandil tablets until 31 March 2026. Pharmacists can substitute brands/strengths without a new script. See [Substituting Scarce Medicines](#) and [About the Shortage of Nicorandil Tablets](#).

Pathway Updates

Updated – 16 January

Animal-related Injury and Illness

Updated – 6 January

Sub-fertility

Updated – 24 December

Antenatal Care - First Consult

Updated – 11 December

Opioid Dependence Treatment (ODT)

Updated – 8 December

Bronchiectasis

[VIEW MORE UPDATES...](#)

About HealthPathways

[What is HealthPathways?](#)

[How do I use HealthPathways?](#)

[How do I send feedback on a pathway?](#)

Essential quick-access links for latest updates, Pathway updates, clinical resources and MBS items

ABOUT HEALTHPATHWAYS

BETTER HEALTH CHANNEL

RACGP RED BOOK

USEFUL WEBSITES & RESOURCES

MBS ONLINE

NPS MEDICINEWISE

PBS

NHSD

Click 'Send Feedback' to add comments and questions about this pathway.

SEND FEEDBACK

Browse clinical suites via left-hand menu, organised into easy to navigate categories

Streamlined Navigation of HealthPathways for General Practice

All Sections in One Place: Assessment, Management, and Referral sections on a single page, making it easy for GPs to quickly navigate the entire clinical pathway without switching screens.



Assessment

Headaches in Adults

Practice point

Avoid unnecessary imaging

A detailed history and basic neurological examination is usually enough to differentiate between benign and serious causes. Low-risk headaches generally do not require imaging to exclude a serious cause.

- Take a detailed history. Look for:
 - [Worrying features](#)
 - Reassuring features:
 - Recurrent episodic headache with long history at presentation
 - No neurological deficit
 - Transient neurological symptoms, and occasionally signs, are common features of migraines
- Assess for features of primary headaches:
 - [Tension-type headache](#)
 - [Migraine](#)
 - [Cluster headache](#)
 - [Other primary headaches](#)
 - [Medication overuse headache](#)
- Screen for:
 - [secondary headaches](#)
 - [iatrogenic causes or contributors](#) and ask about over the counter medication use.
- Suggest using a [headache diary](#) to identify [triggers](#), assess self-medication, and aid diagnosis.



Management

Headaches in Adults

Management

- If patient identifies as Aboriginal or Torres Strait Islander, understand their [specific cultural and spiritual needs](#) when discussing and delivering treatment options, including eligibility for [Integrated Team Care \(ITC\) services](#).
- If any [red flags](#), refer to [Emergency Department](#) immediately via ambulance because of the likelihood of an underlying [serious cause](#).
- If suspected brain tumour, refer to a [neurosurgeon](#) linked to a multidisciplinary team within 24 hours.
- For all primary headaches, avoid treatment with opioids, including codeine, due to the risk of medication overuse headaches.
- Address any patient anxiety about serious pathology. Provide reassurance and offer [non-pharmacological management](#), including patient education.
- If chronic headaches, monitor for [depression](#).
- Establish triggers for avoidance.
- Screen for and optimise other possible contributing factors e.g., [obstructive sleep apnoea](#), alcohol consumption, bruxism, adequate daily hydration, or [optometrist review](#) for refractive error.
- Manage patients with primary headaches in general practice:
 - [Tension-type headache management](#)
 - [Migraine management](#)
 - [Cluster headache management](#)
 - [Medication overuse headache management](#)
- If persistent or chronic secondary headache or orofacial pain, and consistent with [statewide referral criteria](#), consider referral to a [Health Independence Program](#) chronic pain service. See Pain Management Referrals.
- Provide patient pain education, as this plays a key role in management.



Referral

Referral

- If any [red flags](#), refer to [Emergency Department](#) immediately via ambulance because of the likelihood of an underlying [serious cause](#).
- If severe intractable migraine attacks, or status migrainosus (a debilitating attack lasting > 72 hours) with significant vomiting and dehydration, refer to the [Emergency Department](#) for intravenous fluids and antiemetics.
- If suspected brain tumour, refer for [acute neurosurgery assessment](#) with access to multidisciplinary team care.
- Request [non-acute neurology referral](#) if:
 - concerning features on neuroimaging (excluding age-appropriate deep white matter hyperintensities).
 - frequent migraine impacting on daily activities despite prophylactic treatment for consideration of calcitonin gene-related peptide antibodies (CGRP) monoclonal antibodies (mAbs) (CGRP MABs) or Botox treatment.
 - migraine diagnosis is in doubt.
 - chronic or atypical headache unresponsive to medical management (tension headache, cluster headache, trigeminal neuralgia, medication overuse headache).
 - acute assessment is not required, but there are [indications](#) for further investigation.
- If severe refractory cases, refer for inpatient withdrawal via [non-acute neurology referral](#) or [chronic or persistent pain referrals](#).
- If prophylaxis for menstrual migraine is ineffective, consider [non-acute gynaecology referral](#).
- If persistent or chronic secondary headache or orofacial pain, and consistent with [statewide referral criteria](#), consider referral to a [Health Independence Program](#) chronic pain service. See Pain Management Referrals.
- If Aboriginal or Torres Strait Islander patient, offer referral to [specific Aboriginal and Torres Strait Islander services](#). For all referrals, to both mainstream and Indigenous services, ensure Indigenous status is clearly marked on the referral.

Click to Expand

Drop-down boxes appear throughout the pathway, click them to view supplementary information.

Click on the Links

Use the interactive links to open related pathways and resources

Stay Informed: Access Case Studies and Monthly Bulletin

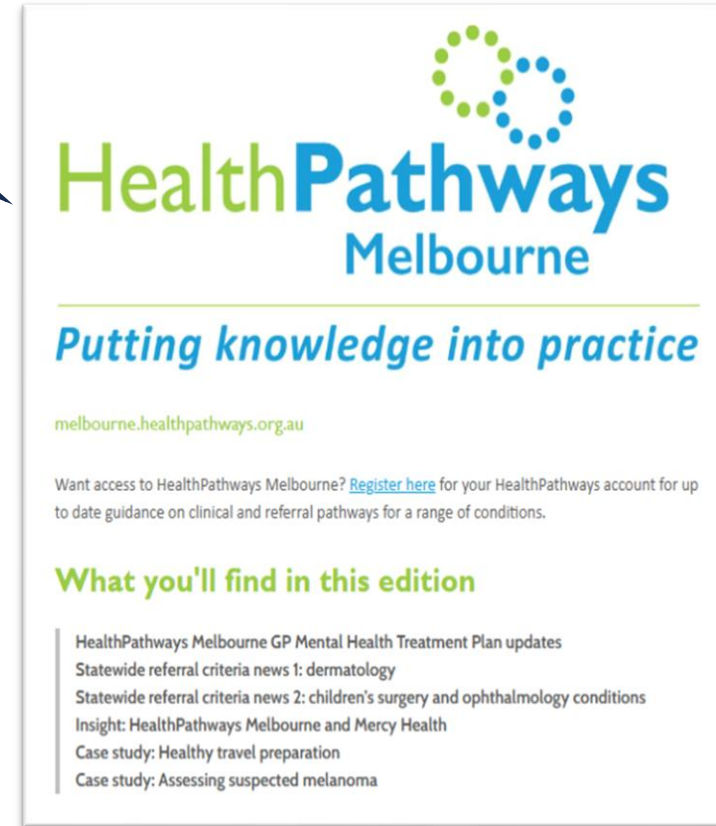
Case Study



 **Real clinical scenarios for everyday GP practice**

- Concise, practical case studies designed to reflect real presentation in General Practice.
- Includes management summaries, pathway links and local service consideration for quick navigation.
- Access all case studies [here](#).

Monthly Bulletin



Monthly updates straight to your inbox

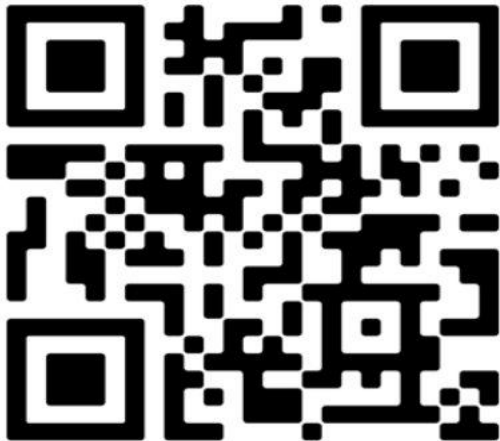
- Be the first to know about pathway updates, service changes, new case studies and employment opportunities

Subscribe to the HealthPathways Melbourne Monthly bulletin or contact us at
info@healthpathwaysmelbourne.org.au

Access Now: Sign In or Scan to Register

Please click on the [Sign in or register](#) button to create your individual account or scan the QR code below.

If you have any questions, please email the team info@healthpathwaysmelbourne.org.au



The logo for Community HealthPathways Melbourne, featuring a stylized blue 'X' icon.

Community HealthPathways Melbourne

Welcome

This website is for health professionals only.

Important update: individual HealthPathways accounts are now required

To enhance the security and personalisation of your HealthPathways experience, shared logins are no longer available. All users will now need to access the site with an individual HealthPathways account.

Sign in or register to request access.

[Sign in or register](#)

Get local health information, at the point of care

[What is HealthPathways?](#) ▾

[General enquiries](#) ▾

[Terms and conditions](#)

The logo for phn Eastern Melbourne, featuring the text "phn" in large blue letters, "EASTERN MELBOURNE" in smaller blue letters, and "An Australian Government Initiative" in small grey letters below.The logo for phn North Western Melbourne, featuring the text "phn" in large blue letters, "NORTH WESTERN MELBOURNE" in smaller blue letters, and "An Australian Government Initiative" in small grey letters below.

Speakers

Dr Vivian Grill is a senior Endocrinologist and Clinical Lead of Metabolic Bone Services at Western Health.

Dr Chris Preston and **Dr Michael Fogarty** are Endocrinologists working within Western Health's Metabolic Bone Clinics.

Dr Alec Ronan is an Endocrinology Registrar completing specialist training at Western Health.

All have clinical and research interests and expertise in metabolic bone disease.



Metabolic Bone Masterclass for the Primary Care Physician

North-West PHN, 15 September 2026



Dr Vivian Grill, Clinical Lead, Metabolic Bone Services
Dr Michael Fogarty, Endocrinologist
Dr Chris Preston, Endocrinologist
Dr Alec Ronan, Endocrinology Registrar

Acknowledgement of Country

Western Health acknowledges the Traditional Custodians of all the lands and waterways on which our staff, volunteers, consumers and caregivers come together.

As we work, learn and grow, we pay our deep respects to the Elders and Traditional Custodians past, present and emerging of the Wurundjeri Woi-Wurrung, Boon Wurrung, Bunurong and Wadawurrung Countries of the greater Kulin Nation.

We are committed to the healing of country, working towards equity in health outcomes, and the ongoing journey of reconciliation.

Western Health is committed to respectfully listening and learning from Aboriginal and Torres Strait Islander people and we are truly guided by the values of relationship, responsibility and respect.

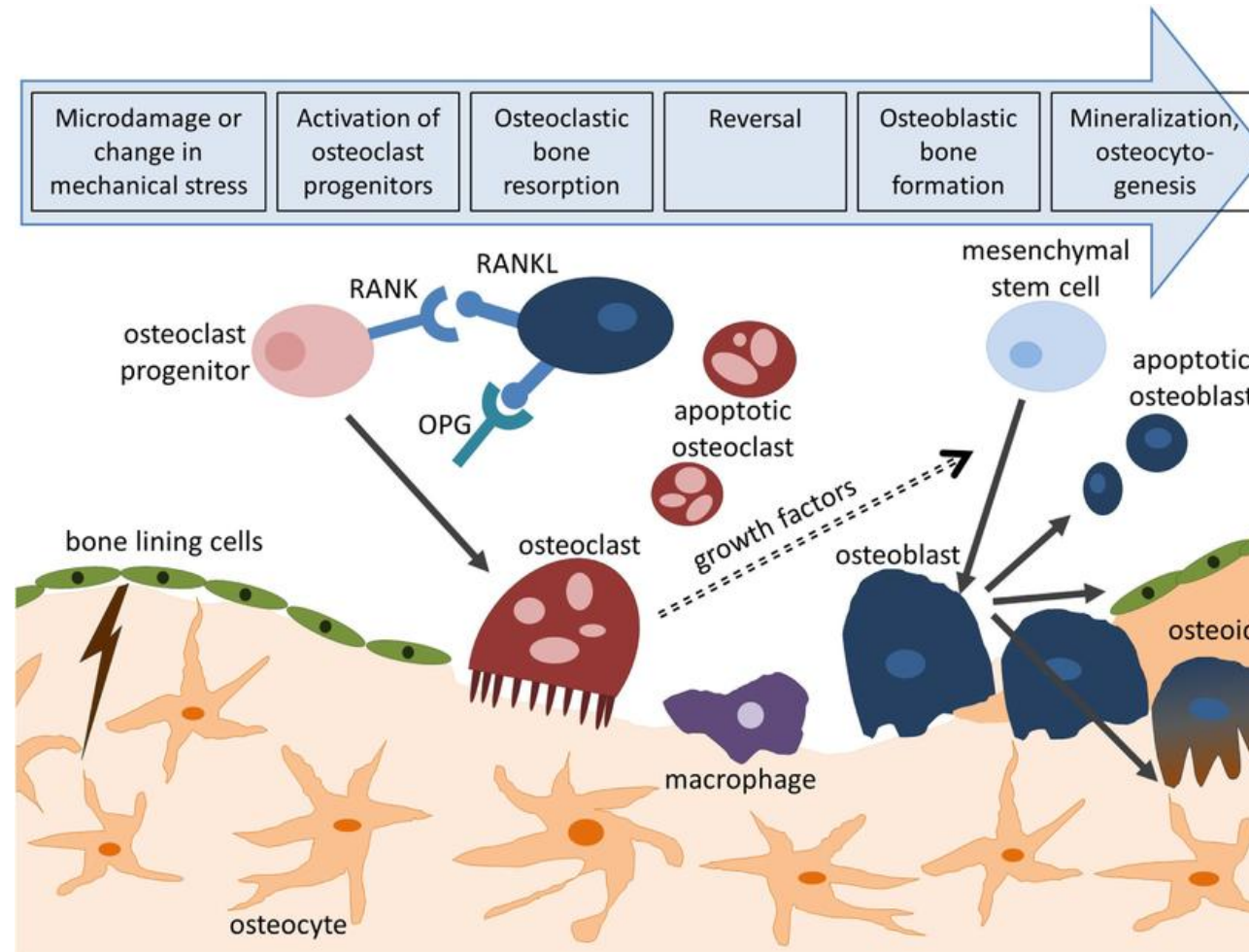


Outline

- **1. Overview of normal bone metabolism and common metabolic bone disorders**
- 2. Local burden of disease - minimal trauma fractures
- 3. Metabolic bone services at Western Health
- 4. Case presentations highlighting common management considerations
- 5. Management decisions in osteoporosis
- 6. Review of current guidelines
- 7. Antiresorptives and newer anabolic medications
- 8. How and when to refer?
- 9. Q+A session

Normal Bone Metabolism

- A dynamic process that balances bone formation and bone resorption



Metabolic Bone Disorders

- Osteoporosis
 - Low bone density with micro-architectural damage leading to high fracture risk
- Osteomalacia
 - Impaired bone mineralisation leading to softening of bones (eg Rickets in children)
- Paget's disease
 - Disorganised and excessive bone remodeling leading to enlarged and mis-shaped bones
- Renal osteodystrophy
 - Altered bone pathology and morphology due to CKD related changes in bone metabolism

Metabolic Bone Disorders

- Fibrous dysplasia
 - Healthy bone replaced by abnormal fibrous tissue leading to weakness and deformities
- Osteogenesis Imperfecta
 - Genetic disorder of defective collagen production leading to brittle bones and fractures
- X-linked hypophosphataemia
 - Genetic disorder of kidney phosphate wasting leading to hypophosphataemic osteomalacia
- Hypophosphatasia
 - Genetic disorder of ALP activity leading to impaired mineralisation of bones and teeth

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Osteoporosis – Burden of Disease

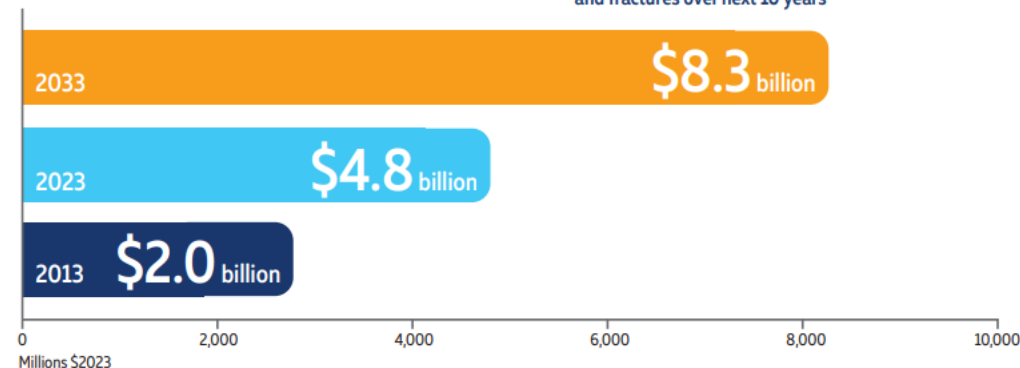
Osteoporosis is a systemic disease characterised by deterioration in bone microarchitecture and low bone density, leading to an increased risk of fracture¹



28% of fractures are hip fractures
20 days per stay
\$35,000-39,000 per hip fracture

Total direct and indirect costs

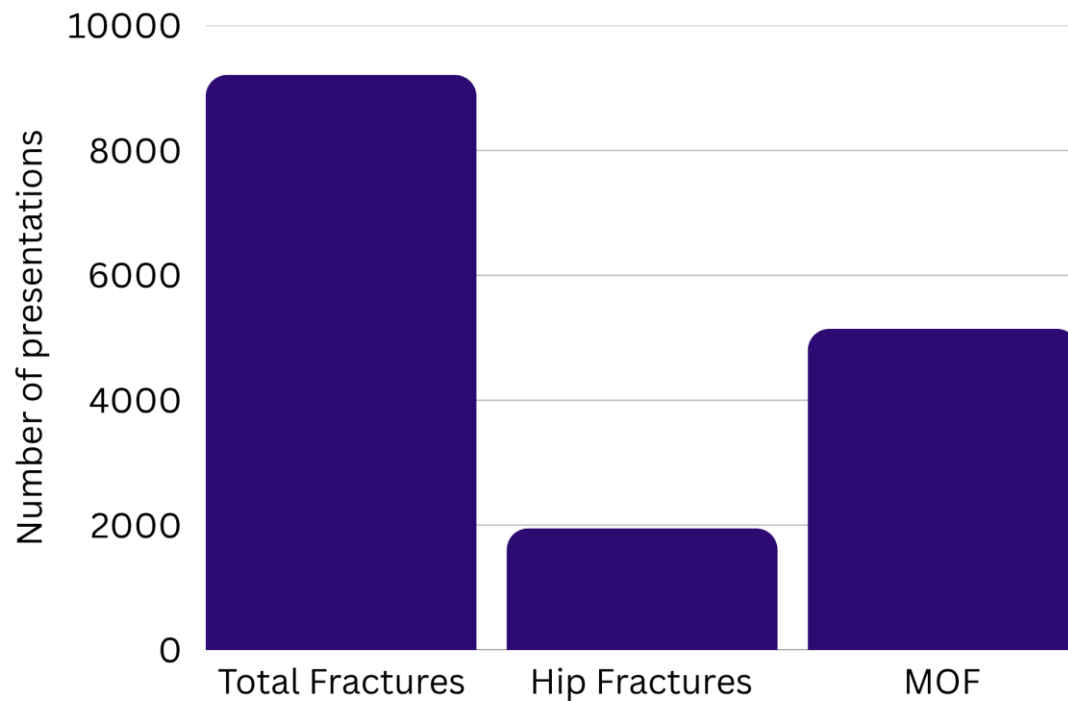
\$67.9 billion⁶
total cost of osteoporosis, osteopenia
and fractures over next 10 years



26% mortality within 1 year of a hip fracture
14% of persons will not return home

Minimal Trauma Fractures in the WH Catchment

WH Fracture Presentations
2018-2022



1842 fracture presentations per year

21% hip fractures

10% persons will have more than one fracture within 5 years

Minimal Trauma Fractures: The Treatment Gap

- 70% of persons are **not** on treatment at the time of their second fracture at WH¹
- This is likely an under-estimate
 - Vertebral insufficiency fractures under-recognised
 - Under-investigated²
 - Under-reported when present on non-targeted imaging^{3,4}
 - Not all fragility fractures require hospital contact
- Worldwide, only 20% of persons who have a fragility fracture undergo appropriate secondary investigations for osteoporosis⁵

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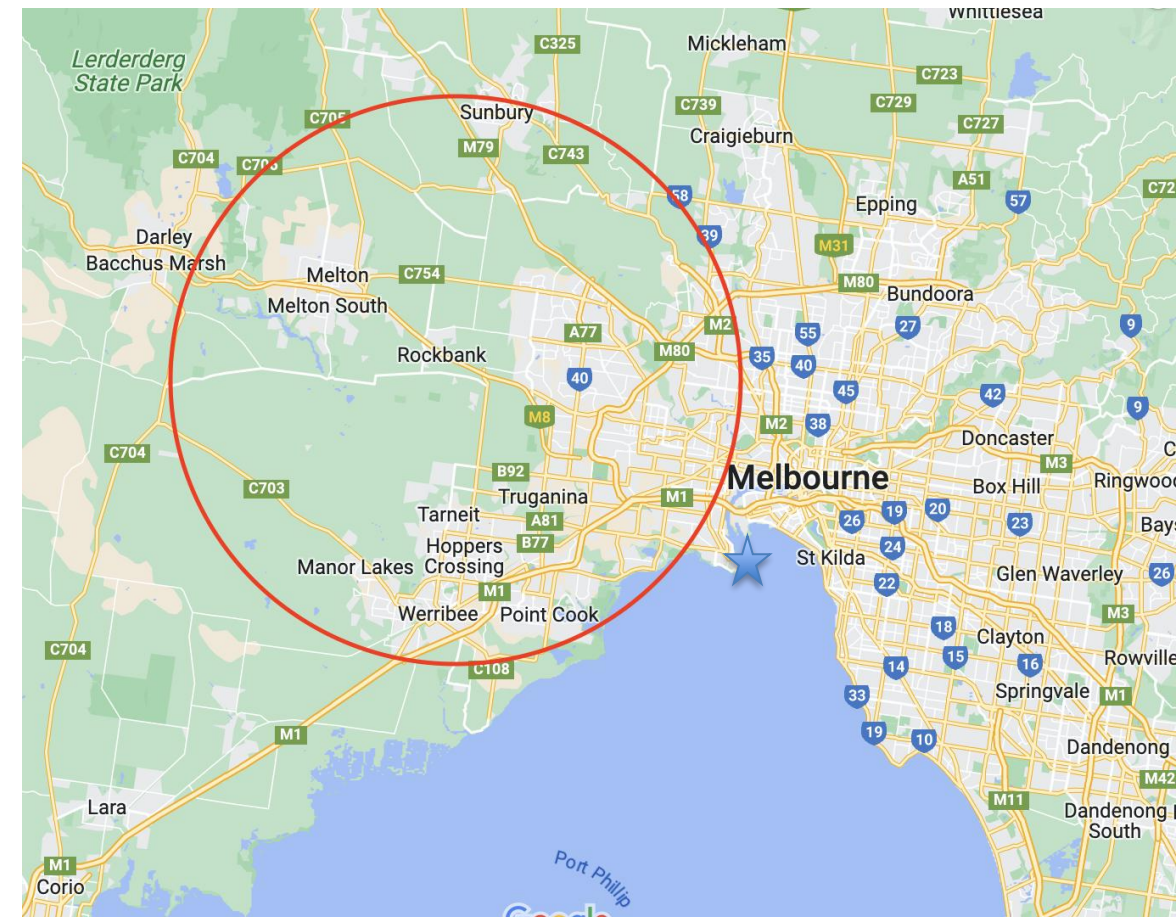
Metabolic Bone Services at Western Health

Western Health - Victoria

- Large catchment servicing Melbourne's West
- Population >900,000
- 270,000 > 50 years old at the 2022 Census
- Socioeconomically demanding, culturally diverse

Metabolic Bone Services

- Endocrinology
- Bone Densitometry (DXA)
- Radiology and Nuclear Medicine
- General and Endocrine Surgery



Metabolic Bone Services at Western Health

Endocrinology

- | | | |
|--------------------------------------|---------------------------|------------|
| • Metabolic Bone Clinic | Wednesday AM | Sunshine |
| • Rapid Access Metabolic Bone Clinic | Wednesday AM | Telehealth |
| • Rapid Access Endocrinology Clinic | Monday AM and Thursday PM | Footscray |

Bone Densitometry (DXA)

- | | | |
|--------------------------------|-----------------|----------|
| • Hologic Bone Density Machine | Monday - Friday | Sunshine |
|--------------------------------|-----------------|----------|

Radiology and Nuclear Medicine

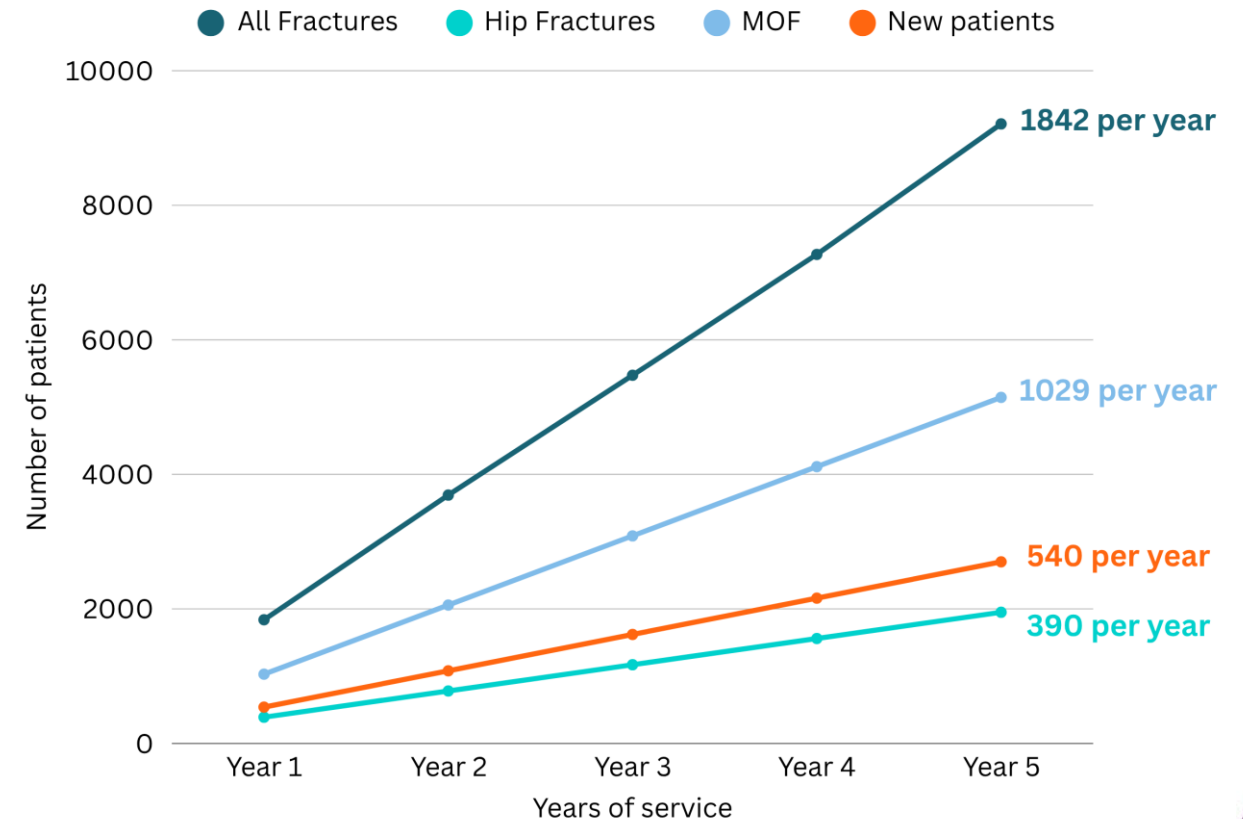
- | | |
|---|----------------------|
| • XR, CT, MRI, NM Bone Scan | Footscray & Sunshine |
| • Parathyroid localisation: US, Sestamibi, 4DCT | Footscray & Sunshine |

Metabolic Bone Services at Western Health

- Bone densitometry service
 - Sunshine Hospital - Level 4, Western Centre for Health, Research and Education
 - Offered via Medicare
 - DXA scans and bone densitometry reporting
- Weekly multi-disciplinary meetings
 - Endocrinology and Radiology
 - Review of imaging
 - Discussion of complex diagnostic and management cases

Metabolic Bone Services at Western Health

- 540 new appointments in the metabolic bone service per year
- 65% of patients are reviewed for a primary diagnosis of osteoporosis
- 40% with osteoporosis are awaiting their next appointment for treatment with Zoledronic Acid¹
 - This leads to significant delays in review for at risk persons

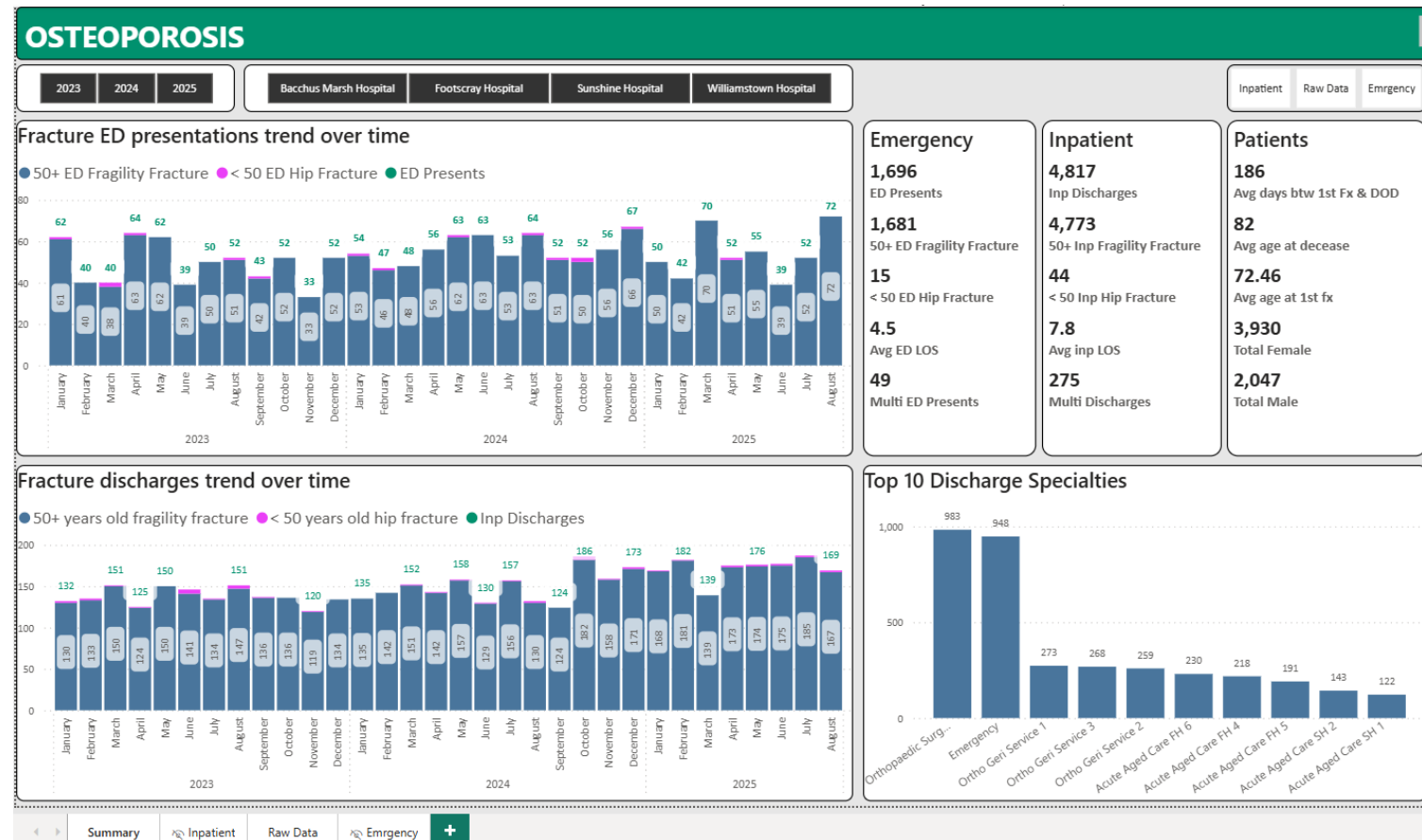


Endocrine Nurse Practitioner Clinic

- New clinic for persons prescribed an extended course of Zoledronic Acid at WH
 - Fortnightly, running in concert with the MBD Clinic
- Undertakes the review prior to infusion; bloods, dental, incident fracture, **allowing discharge from MBD clinic**
- Inclusion criteria; 1-3 further doses of Zoledronate for uncomplicated osteoporosis
- Review of bone density 12-18 months post 3rd ZA dose, discharge to GP if achieving osteopenia without incident fracture **vs** re-integration into MBD clinic
- Commenced in July 2026, expansion to be determined by demand and evaluation of clinic

Future plans - WH Osteoporosis Dashboard

- Harnessing EMR to capture fracture presentations
- Utilising healthcare data to identify persons at risk of future fragility fractures, review and establish a management plan in a timely manner



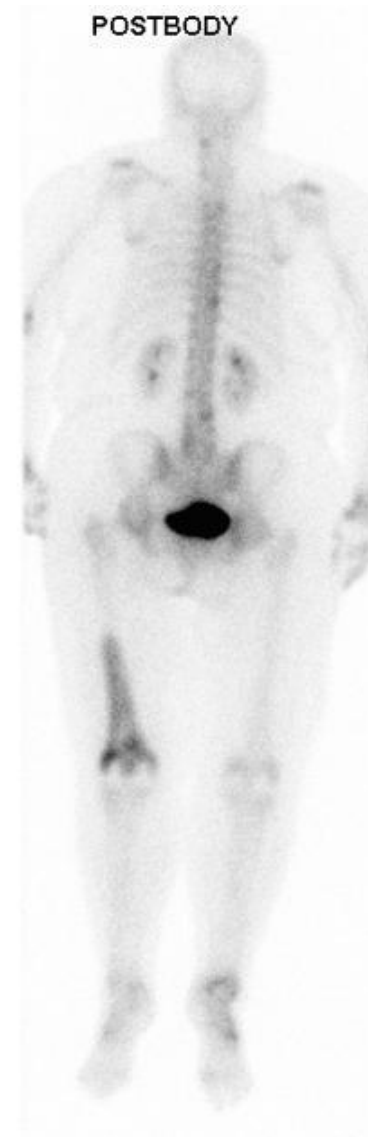
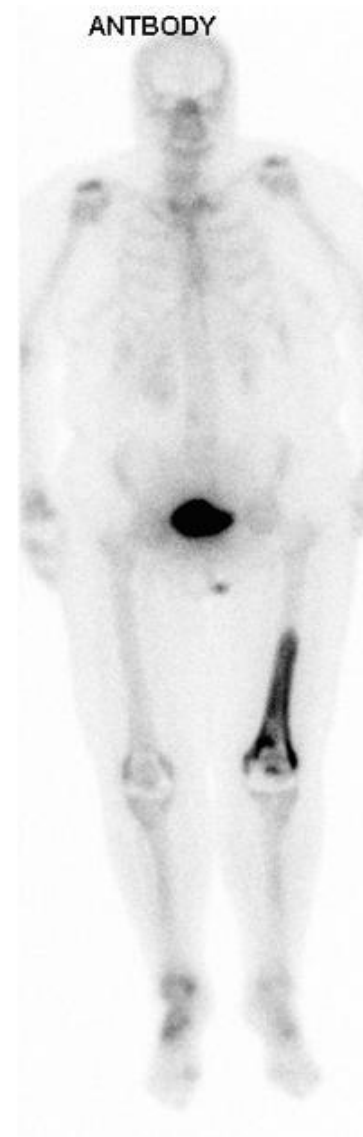
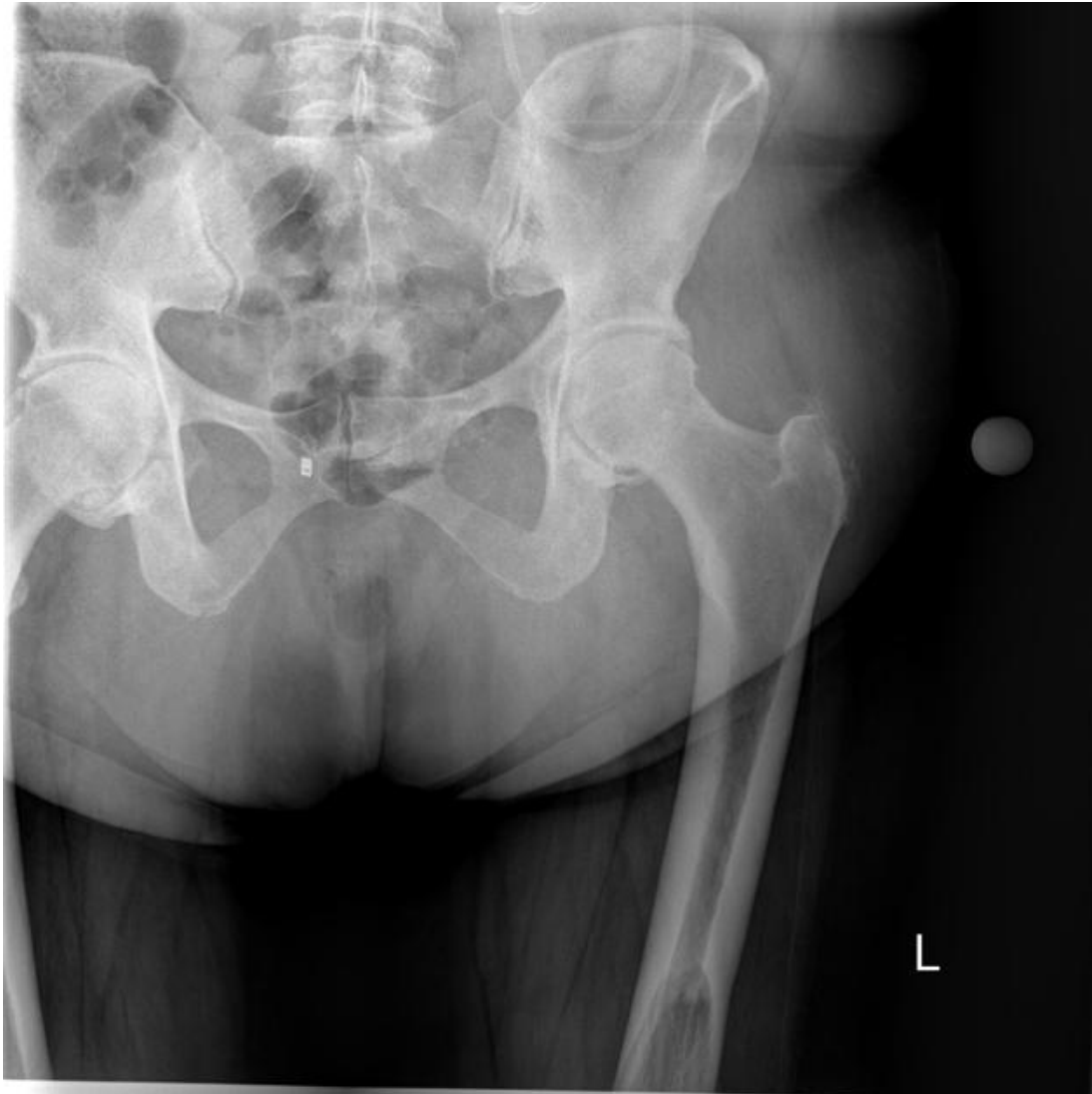
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Case 1: Mr PD

- 48M p/w **atraumatic** L thigh **pain**
- Past History
 - Overweight
 - Hypertension
 - Dyslipidaemia
- Medications
 - Perindopril
 - Amlodipine
 - Atorvastatin
- Social History
 - Lives with partner
 - High school teacher
 - Non-smoker, minimal EtOH
- Examination
 - Normal bony alignment
 - No overlying skin changes
 - Neurological exam unremarkable

Case 1: Mr PD



Case 2: Mrs OP

- 62F p/w **atraumatic** L thigh **pain**
- Past History
 - Dyslipidaemia
 - Menopause age 48
 - Postmenopausal osteoporosis
- Medications
 - Atorvastatin
 - Vitamin D
 - Denosumab (8 years)
- Social History
 - Lives alone
 - Retired banker
 - Ex-smoker, social EtOH
- Examination
 - Healthy dentition
 - No kyphosis
 - Normal hip and gait examination

Case 2: Mrs OP

- 62F p/w **atraumatic** L thigh **pain**

- Initial Pathology

• Cr	88	(40-90)
• eGFR	86	(>60)
• Ca	2.20	(2.15-2.65)
• Mg	0.75	(0.60-1.10)
• PO4	0.94	(0.75-1.50)
• ALP	75	(30-110)
• 25-OH D	76	(>50)

- Additional Tests

• CK	NAD
------	-----

- Bone Turnover Markers

• CTX	146	(100-1000)
• P1NP	45	(15-115)

- Considerations

- AFF?
- Long-term treatment plan?

Atypical femoral fracture

Distal to lesser trochanter and proximal to supracondylar flare

Major features (at least 4)

- minimal or no trauma
- mostly transverse or slightly oblique
- must involve the lateral cortex
- non-comminuted or minimally comminuted
- localized endosteal or periosteal thickening

Minor features

- generalized diaphyseal cortical thickening
- prodromal symptoms (e.g. groin or thigh pain)
- bilaterality
- delayed fracture healing

Exclusion criteria

- femoral neck or intertrochanteric
- spiral or comminuted
- periprosthetic
- pathologic bone (e.g. bone tumor)

Reference: *J Bone Miner Res.* 2013;29(1):1-23

Case 2: Mrs OP

- 62F p/w **atraumatic** L thigh **pain**
- Review of Osteoporosis History
 - No minimal trauma fractures ever
 - DXA-defined osteoporosis only
 - Denosumab 8 years, no missed doses
- BMD response to treatment

	LS	LFN
2018	0.709g/cm ² (T -3.1)	0.537g/cm ² (T -2.8)
2026	0.748g/cm ² (T -2.4)	0.558g/cm ² (T -2.4)



- No signs of AFF but what to do now?

Case 3: Mrs AN

- 72F p/w L thigh **pain** following **fall** from standing height
- Past History
 - T2DM
 - IHD with previous PCI
 - Osteoporosis
- Medications
 - Aspirin + Statin
 - Metformin + Empagliflozin
 - Valsartan/Amlodipine + Bisoprolol
- Social History
 - Lives with husband
 - Retired high school principal
 - Non-smoker, minimal EtOH
- Examination
 - Full dentures
 - L leg externally rotated
 - Tender and unable to weight bear

Case 3: Mrs AN

- 72F p/w L thigh **pain** following **fall** from standing height

- Initial Pathology

• Cr	110	(40-90)
• eGFR	76	(>60)
• Ca	2.32	(2.15-2.65)
• Mg	0.84	(0.60-1.10)
• PO4	0.70	(0.75-1.50)
• ALP	92	(30-110)
• 25-OH D	72	(>50)



Case 3: Mrs AN

- 72F p/w L thigh **pain** following **fall** from standing height
- Review of Osteoporosis History
 - Osteoporosis diagnosed on DXA at age 70
 - L2 vertebral crush fracture on initial VFA
 - 2x doses of Zoledronic Acid so far

- BMD at baseline

	LS	LFN
2024	0.722g/cm ² (T -2.8)	0.504g/cm ² (T -3.0)

- What to do now with osteoporosis treatment?

Outline

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Management Decisions in Osteoporosis

- Who requires treatment with an antiresorptive or anabolic agent?
- When to start treatment?
- What to do before starting treatment?
- Choice of first-line medication?
- When to stop or escalate treatment?
- Sequential therapy considerations?
- What to do if there is a new fracture on treatment?
- Additional considerations – eg patient needs a tooth extraction
- Long-term plan ie “exit strategy”?

Determining the best treatment: What the Patient thinks

- Cost of specialist appointments, investigations and medications
- Safety
- Side effects – common vs rare but severe
- Route of administration (needle phobia)
- Chance of “cure”
 - Normalising bone density
 - Preventing further fractures

Determining the best treatment: What the Dr thinks

- Consider age and general health of the patient
- Severity of osteoporosis (T score)
- Comorbidities and renal function
- Contraindications to any particular treatment option
- Patient preference
- Expected improvement eg with antiresorptive vs anabolic agents
- PBS eligibility vs patient capacity to privately fund
- Long term plan for consolidation

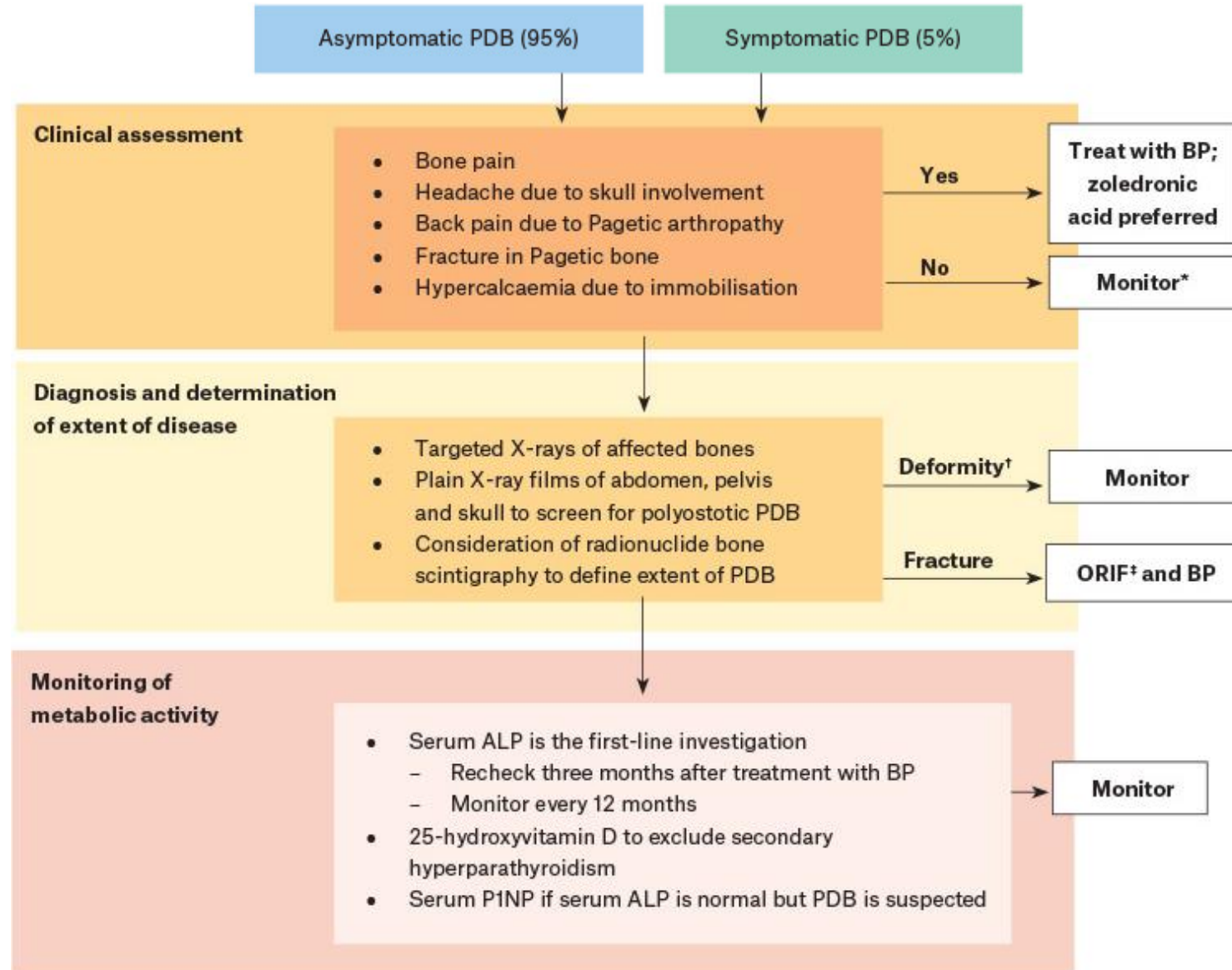
Management Approach

- Who needs treatment?
 - Patients with a history of osteoporotic fracture
 - Patients at high risk of fracture
- Who is at high risk of fracture?
 - FRAX >20% absolute risk of major osteoporotic fracture
 - FRAX >3% absolute risk of hip fracture
- In these groups, the benefits of treatment greatly outweigh risks, with significantly greater number of fractures prevented for every uncommon adverse event

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Current Guidelines – Paget's Disease



Current Guidelines – Osteoporosis

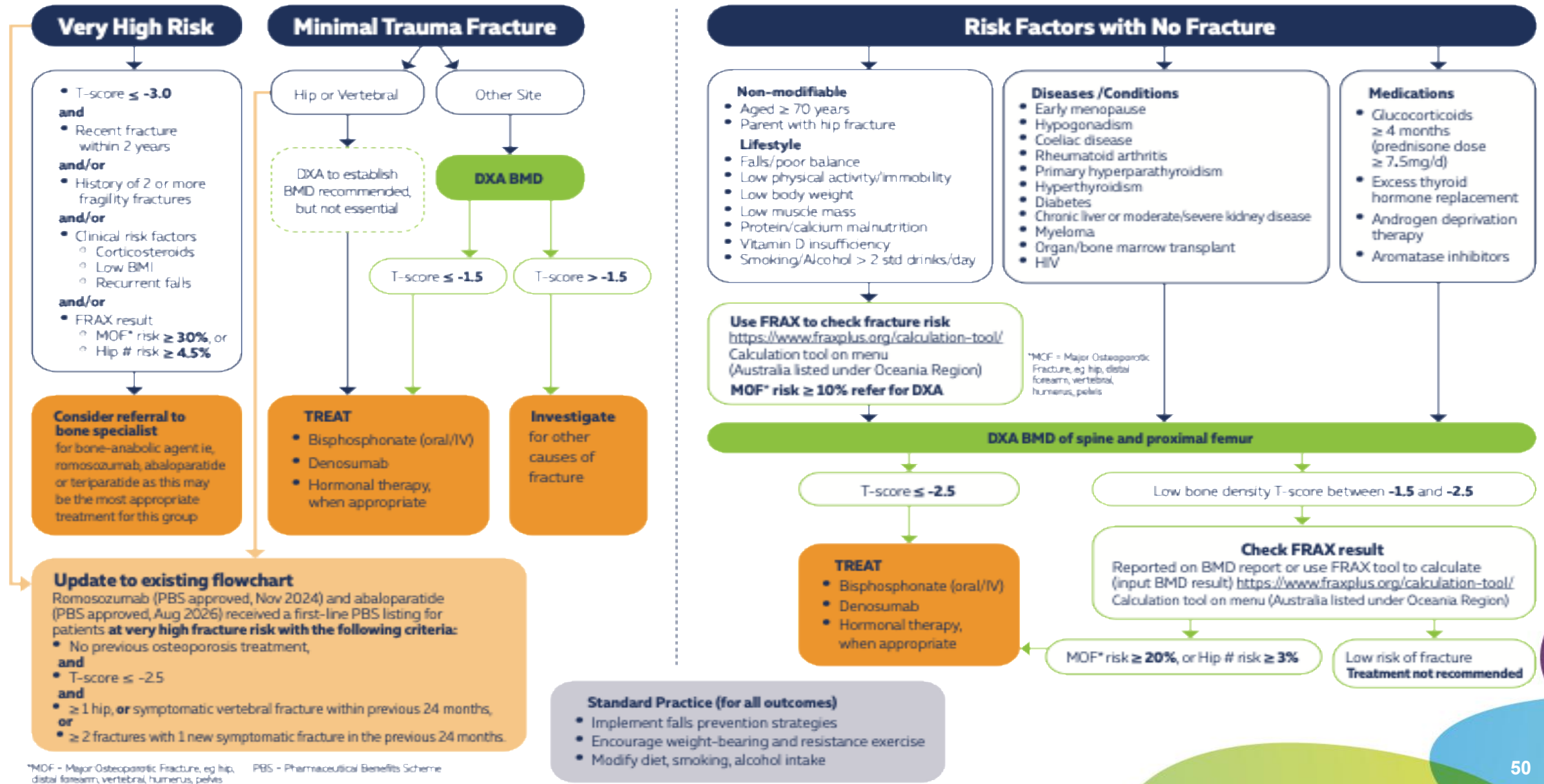
Identifying patients to investigate for osteoporosis	All individuals over the age of 50 years who sustain a fracture following minimal trauma (such as a fall from standing height, or less) should be considered to have a presumptive diagnosis of osteoporosis. (Recommendation 1 A) Conduct a clinical risk factor assessment in post-menopausal women and men over the age of 50 years with one or more major risk factors for minimal trauma fracture to guide bone mineral density (BMD) measurement and prompt timely referral and/or drug treatment. (Recommendation 2 A) A presumptive diagnosis of osteoporosis can be made in a patient with a vertebral fracture or hip fracture in whom there is no history of significant trauma. Caution regarding diagnosis and treatment should be exercised if only a single mild vertebral deformity (height loss) is detected, especially in a patient under the age of 60 years. (Recommendation 3 B)
Case-finding	Those ≥ 50 years of age with a current or prior minimal trauma fracture (MTF) should be assessed and appropriately treated. (Recommendation 7 A) For those ≥ 50 years of age with lifestyle and non-modifiable risk factors (eg, parent with hip fracture) use FRAX[®] to calculate absolute fracture risk. When FRAX[®] risk for Major Osteoporotic Fracture (MOF) is $\geq 10\%$, refer for DXA. If $< 10\%$, DXA not recommended. Re-stratify risk with FRAX[®] after DXA using BMD reading and treat when: • BMD T-score ≤ -2.5, or • BMD T-score between -1.5 and -2.5 and FRAX[®] risk for MOF $\geq 20\%$ and/or hip fracture risk $\geq 3\%$. (Recommendation 9 C)

Current Guidelines – Osteoporosis

Calcium, Protein, Vitamin D	For frail and institutionalised older people: Calcium and vitamin D supplementation, together with adequate protein intake are recommended for fracture prevention. Optimisation of calcium and vitamin D should be the standard of care for this group of people. (Recommendation 12 B)
Exercise	Exercises recommended to reduce fracture risk: • muscle resistance (strength) training should be regular (at least twice a week), moderate–vigorous and progressive • weight-bearing impact exercises should be performed most days (at least 50 moderate impacts) and include moderate-to-high loads in a variety of movements in different directions • balance training activities should be challenging Limit prolonged sitting (sedentary behaviour). (Recommendation 17 B)
Medication related osteonecrosis of the jaw (MRONJ)	MRONJ is a rare complication of osteoporosis therapy and most patients will not be at increased risk of MRONJ. Consider patient risk of MRONJ prior to starting osteoporosis therapy and ensure high-risk patients receive dental review prior to therapy initiation. Given the long in vivo half-life of bisphosphonates, there is little benefit to their cessation prior to dental extraction. Invasive dental procedures in patients on denosumab should be performed just prior to the next 6-monthly injection as the in vivo effect on bone suppression will be waning. (Recommendation 45 C)

Osteoporosis Risk Assessment, Diagnosis and Management

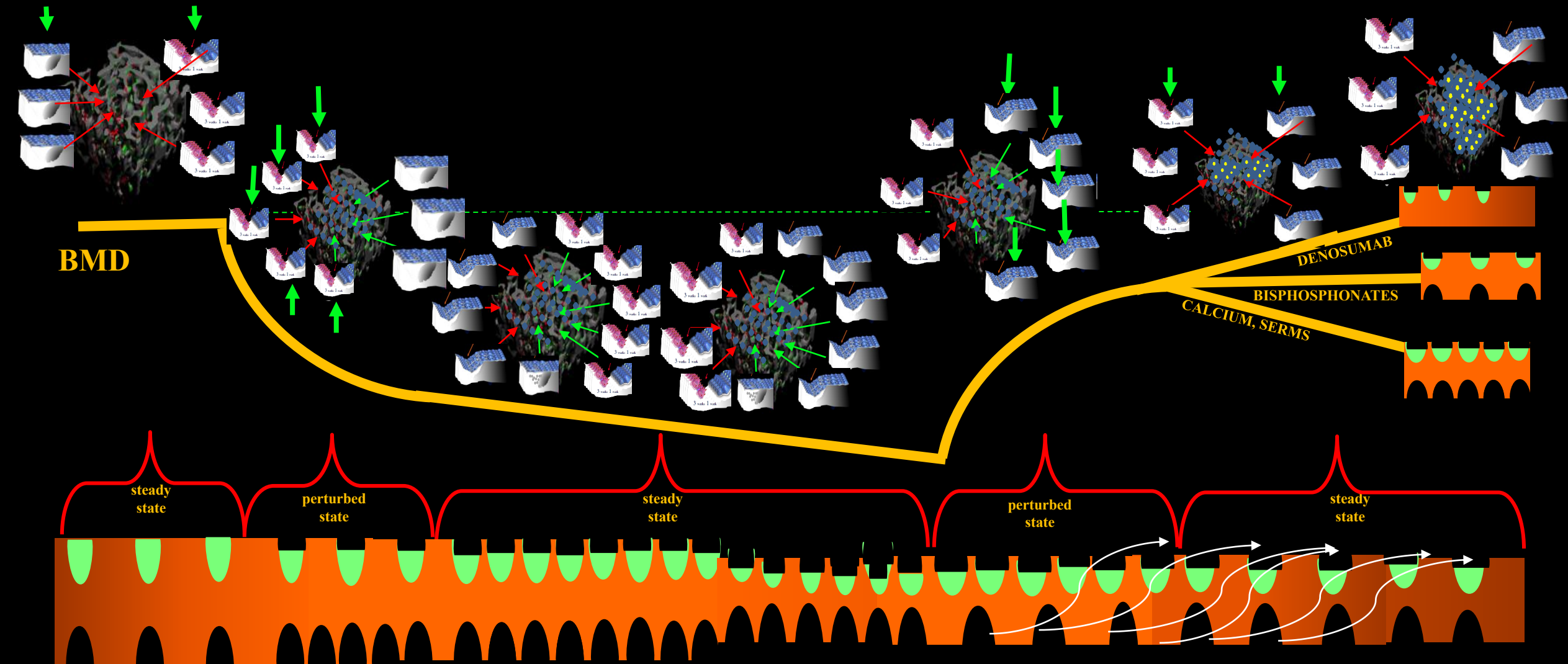
Recommendations for postmenopausal women and men aged >50 years



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A concept diagram of antiresorptives, with many thanks to Prof Ego Seeman



Antiresorptives

- Bisphosphonates
 - Incorporate into hydroxyapatite crystals in bone matrix, directly toxic to osteoclasts
 - Considerations: renal function, ONJ, treatment duration
 - Zoledronate
 - Reduces hip fractures by 40% and vertebral fractures by 70%
 - Post hip fracture is associated with 30% mortality reduction and 60% reduction in refracture at 24 months¹
- Denosumab
 - RANK-L inhibitor; prevents activation of osteoclasts
 - Potent, but time-sensitive
 - Considerations: renal function, life expectancy, treatment duration, ONJ

Duration of Treatment and Drug Holidays

- Healthy bone turns over
 - Antiresorptives prevent this
- Changes in the mechanical composition accrue over time
- Examination of hips and spine is important
 - +/- femur X-rays
- Bisphosphonates: 5-7 years
- Denosumab: 10 years



Xray example of an atypical femoral fracture

Osteonecrosis of the Jaw

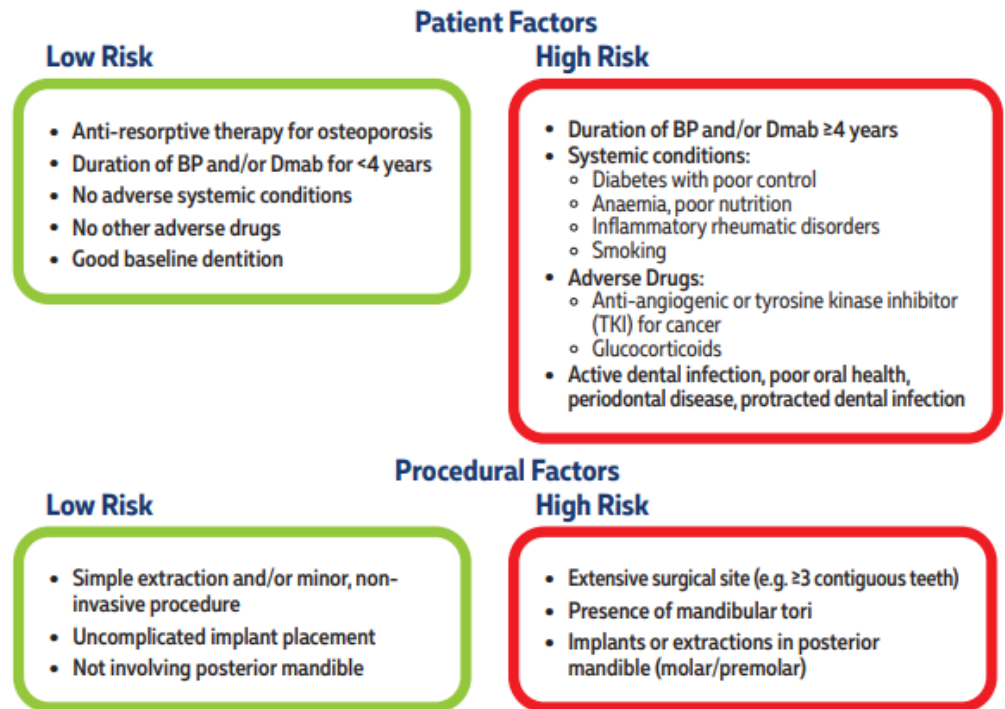
- Chronic inflammation and bacterial infection in the periapical region (the bone within the region of the tooth root apex)
- Impairment in gum and bone healing due to aberrations in vascular supply and ischaemia (compounded by smoking, diabetes, anti-angiogenic therapy)
- Nutritional aspects contributing to poor tissue healing
- Disordered osteoclast activity and reduced local remodelling
- Genetic factors relating to collagen formation, bone turnover and angiogenesis

Possibly 1-2.5% of persons undergoing invasive dental work whilst on therapy

MUCH higher risk in persons on antiresorptive in the treatment of malignancy

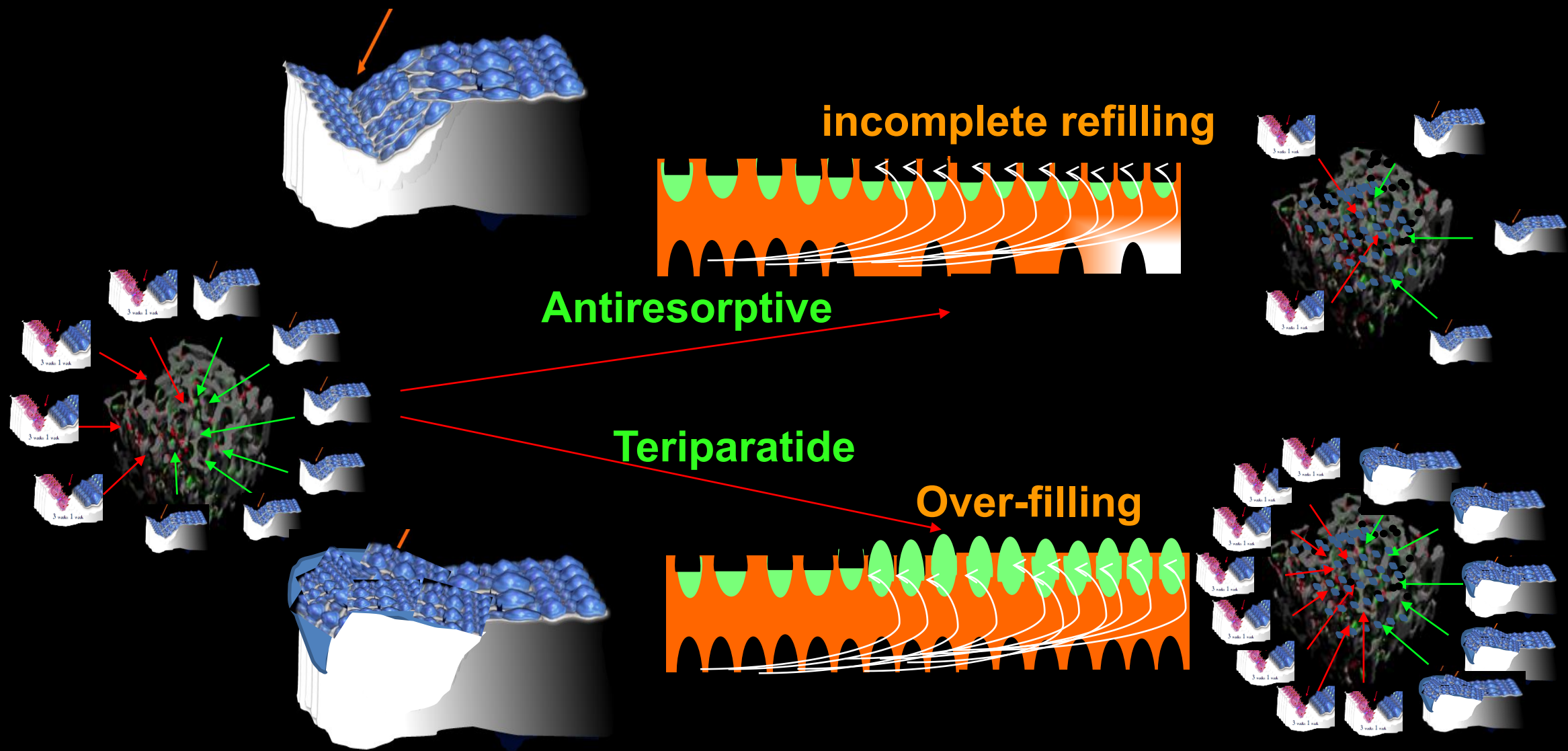
Encourage good dental hygiene, and your antiresorptive will prevent a hip fracture, and avoid this risk

Healthy Bones Australia Consensus Statement: Medication-related Osteonecrosis of the Jaw (MRONJ) and Osteoporosis



Teriparatide

- Synthetic analogue of human PTH
- Stimulates PTH receptor on osteoblasts and osteocytes to increase bone remodeling
- Activation of osteoclasts is subsequent to this
- Bone effects
 - Persistent activation (hyperparathyroidism) leads to bone breakdown with increased osteoclast activity, and osteoporosis
 - Intermittent activation with PTH analogues leads to bone accumulation

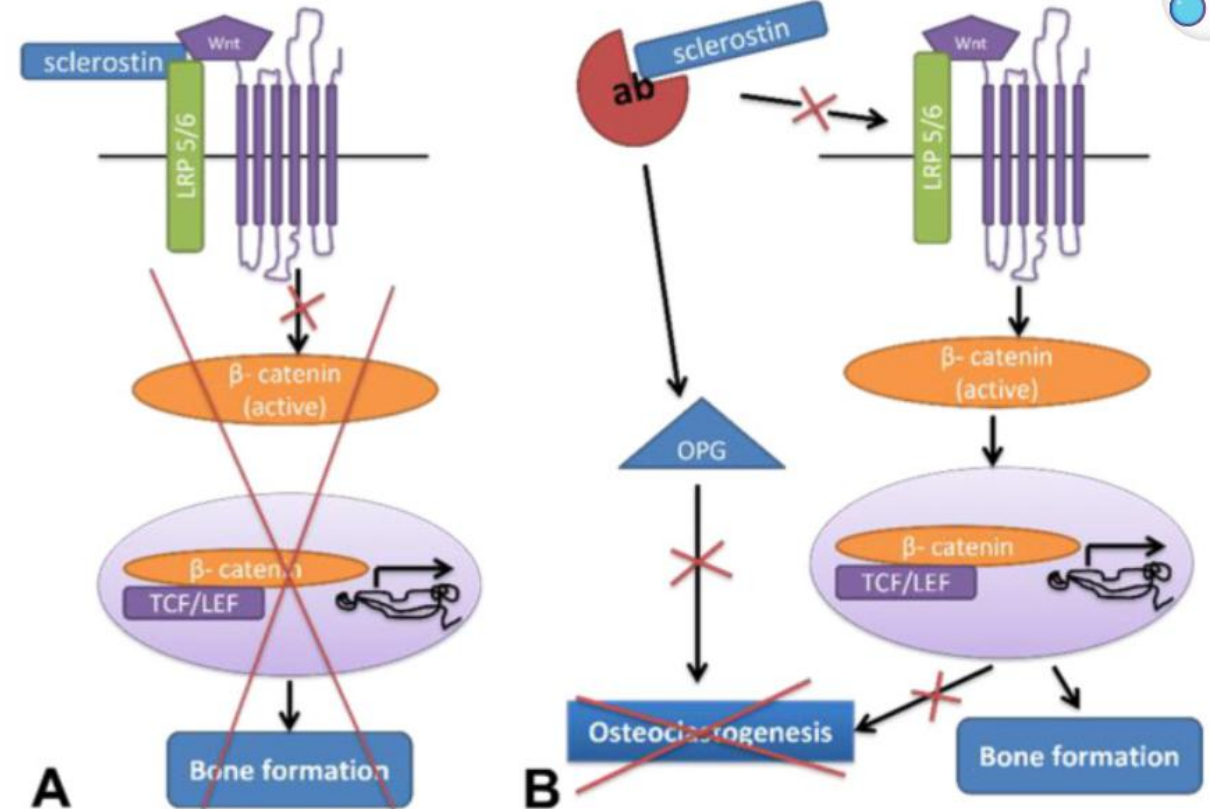


Teriparatide – the How

- 20mcg SC daily for 18 months
- Avoid if:
 - Previous hyperparathyroidism
 - Skeletal malignancy
 - Paget's disease
 - Hypercalcaemia
- Second line PBS therapy only

Romosozumab

- Target = sclerostin
 - An osteocyte-secreted negative regulator of bone formation
- Promotes RANKL expression on osteocytes, increased osteoclastogenesis
- Prevents osteoblastogenesis, decreases osteoprotegerin (decoy receptor for RANKL)
- Suppresses osteoclast-mediated bone formation (remodelling-based bone formation)



Vasiliadis *J Clin Med* 2022

Romosozumab actions

- Bone resorption coupled / remodelling-based bone formation (RBF)
 - Dominant action
 - Leads to a net positive bone balance
- Modelling based formation (MBF)
 - Typically occurs in growth, development, and in response to mechanical loading
 - Occurs at all surfaces of bone including trabeculae, strengthening mechanical structure and load bearing capacity of bone
- Weak suppression of RANKL expression
 - Inhibits sclerostin, ?Mild antiresorptive effect

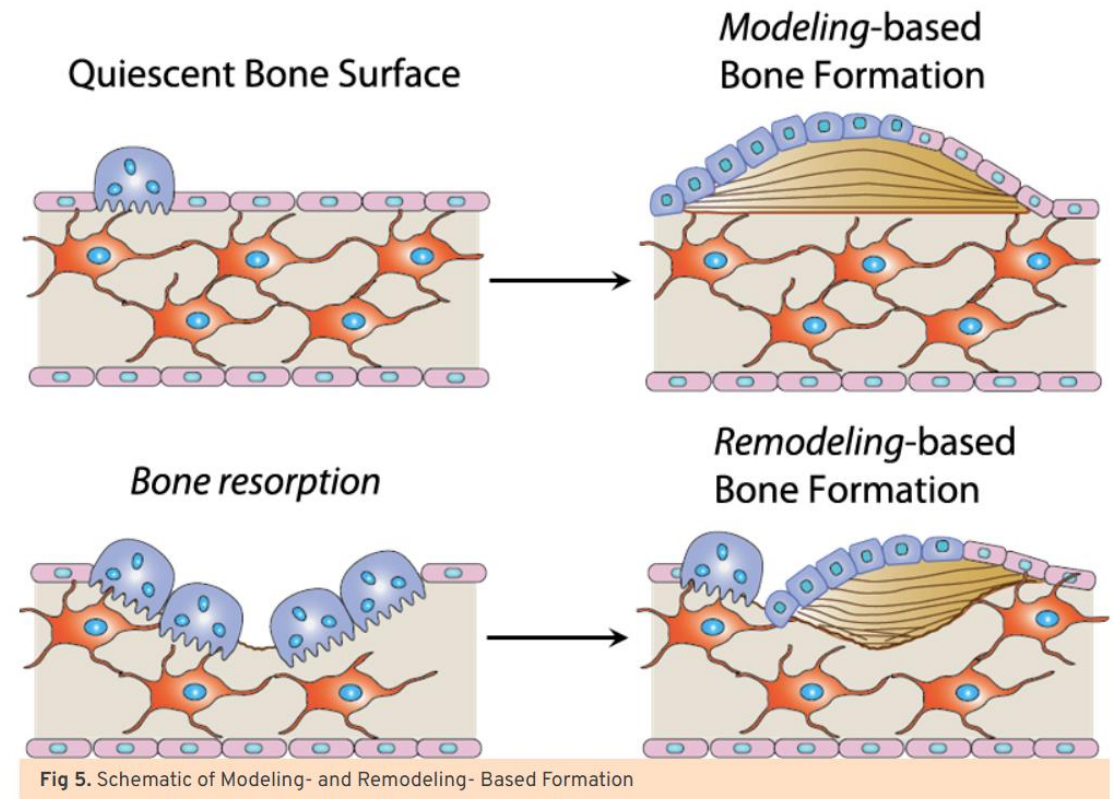
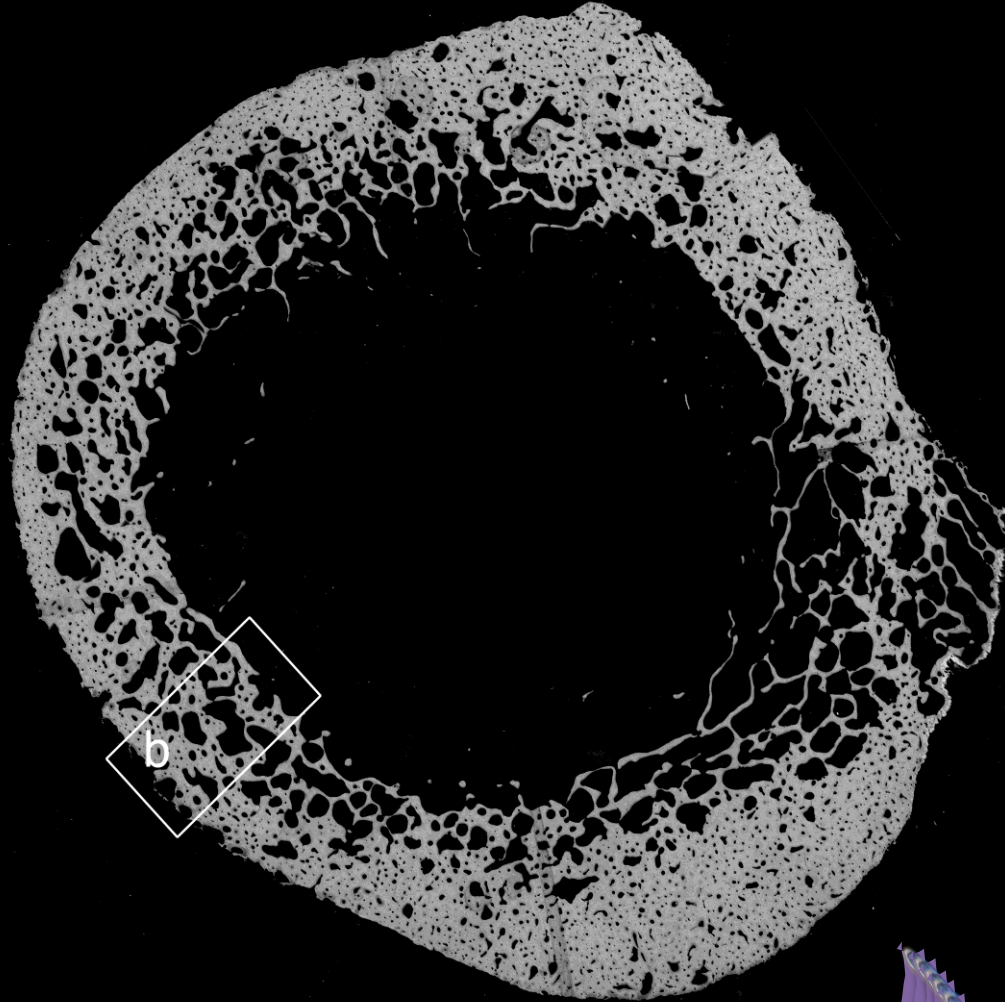
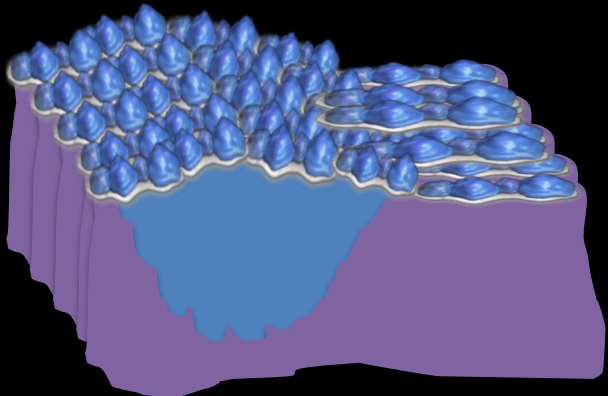


Diagram from UPenn department of medicine

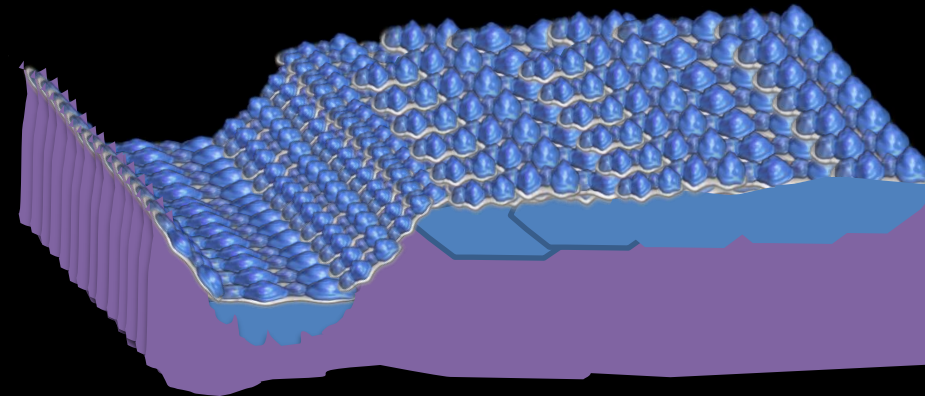
Romosozumab – Things to Know

- Monthly injection for 12 months; then lock it in with an antiresorptive following
- PBS indication for first line therapy
 - BMD on T-score -2.5
 - Symptomatic fracture
 - 1 hip or vertebral fracture within the previous 24 months
 - 2 fractures previously with 1 in the previous 24 months
- Black box warning
 - Not for use if evidence of myocardial infarction or stroke
 - 1 or 2 major trials demonstrated increased incidence in comparison to alendronate
- With mild anti-resorptive effect can cause ONJ

PTH, Abaloparatide
Primarily
Remodelling based



Romsozumab
Primarily
Modelling based



Abaloparatide

- Synthetic analogue of human PTHrp
- Stimulates PTH1 receptor on osteoblasts and osteocytes to increase bone remodeling
- Activation of osteoclasts is subsequent to this
- In comparison to Teriparatide, has a specificity for the G-protein-dependent receptor.
 - reduced duration of intracellular activity, reduced calcemic response, and RANKL production

Abaloparatide

- Comparison of effects vs Teriparatide
- Lower incidence of hypercalcaemia
- Increased effect bone formation as measured by bone densitometry
- Decreased hip and non-vertebral fractures

Abaloparatide – the How

- 80mcg SC daily for 18 months
- Avoid if:
 - Previous hyperparathyroidism
 - Skeletal malignancy
 - Paget's disease
 - Hypercalcaemia
- FIRST LINE and second line PBS therapy
 - PBS indication for first line therapy
 - BMD on T-score -2.5
 - Symptomatic fracture
 - 1 hip or vertebral fracture within the previous 24 months
 - 2 fractures previously with 1 in the previous 24 months

Does Order Matter?

- A long course of denosumab up front makes things difficult
- All agents will impart some effect by harnessing the remodelling cycle of bone regeneration
- Anabolic agents up front demonstrates the best improvement in bone density; however we are limited by the PBS

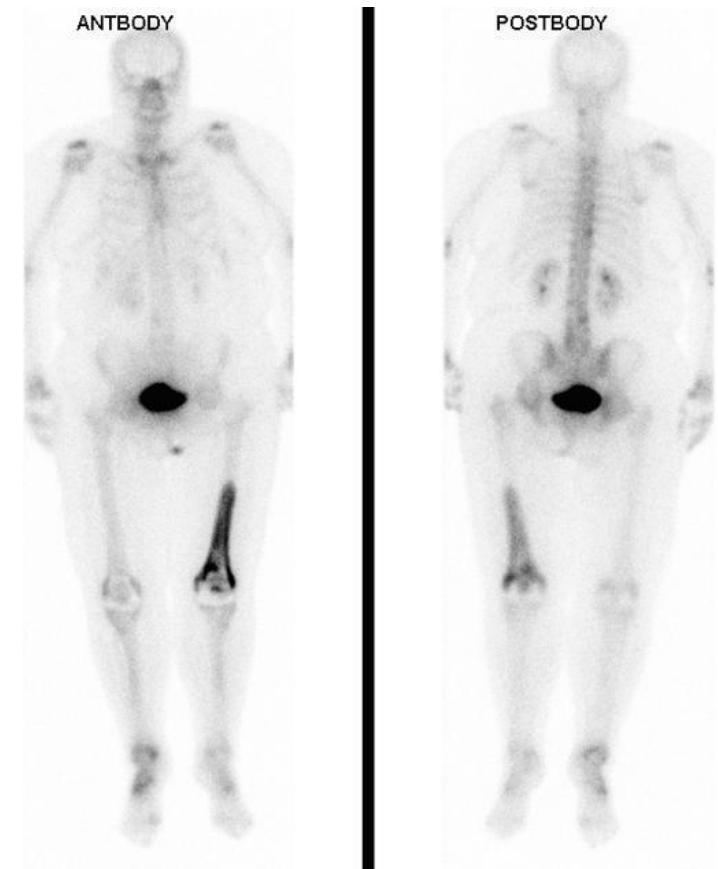
Anabolic agents on the PBS as second line therapy

- T-score -3.0 or less
- 2 or more fractures
- At least 1 after 12 months of treatment with anti-resorptive therapy

Back to our cases...

Case 1: Mr PD

- 48M p/w **atraumatic** L thigh **pain**
- Diagnosis = active Paget's disease
 - Monostotic (left femoral shaft)
 - Symptomatic with pain at site of disease
- Treatment
 - Single dose 5mg Zoledronic Acid
- Progress
 - Rapid resolution of pain with normalisation of ALP



Case 2: Mrs OP

- 62F p/w **atraumatic** L thigh **pain**
- No AFF (yet) but remains at high risk
 - Good BMD response to Denosumab
 - T-scores improved to osteopenia range
- Treatment
 - Consolidation with Zoledronic Acid
- Progress
 - BTMs monitored to inform optimal ZOL timing



Case 3: Mrs AN

- 72F p/w L thigh **pain** following **fall** from standing height
- Diagnosis = minimal trauma fracture
 - Baseline T-score -3.0 at LFN
 - New fracture after 2 years Zoledronic Acid
- Treatment
 - Abaloparatide (Romosozumab CI in IHD)
- Progress
 - No SFX, planned to complete 18 months



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When to refer - Metabolic Bone Disease

Criteria for referral to public hospital specialist clinic services

- Suspected metabolic bone disease that is not osteoporosis (for example: Paget's disease, fibrous dysplasia, osteomalacia, osteogenesis imperfecta)
- Persistent osteoporosis despite 3 years of maximum antiresorptive treatment
- Intolerance to, or contraindication for, maximum antiresorptive treatment
- Metabolic bone disease associated with:
 - treatment with glucocorticoid medicines
 - chronic kidney disease
 - post-transplant.
- Osteoporosis in women younger than 50 years or men younger than 60 years
- Secondary osteoporosis due any of the following:
 - hyperthyroidism
 - primary hyperparathyroidism
 - male hypogonadism
 - amenorrhea in women younger than 40 years.
- Advice on, or review of, management plan in patients with stable metabolic bone disease after 5 years of treatment.

When to refer - Metabolic Bone Disease

Information that must be provided

- Details of all fractures, including location
- Details of previous medical management including the course of treatment and outcome of treatment
- Current and complete medication history (including non-prescription medicines, herbs and supplements)
- Recent (preferably in last 3 months):
 - serum calcium result
 - serum 25-hydroxy vitamin D (25(OH)D)
 - phosphate blood test result
 - creatinine and electrolytes result
 - albumin blood test result
 - alkaline phosphate (ALP) blood test result.
- Relevant comorbidities.

Provide if available

- Current or previous bone densitometry results
- Current or previous radiological reports of any fractures
- Parathyroid (PTH) blood test result.

Referral to a public hospital is not appropriate for

- Osteoporosis that has not been treated
- Age appropriate osteopenia without fracture(s)
- When the person's life expectancy is less than 6 months.

Metabolic Bone Disorder Specialist Clinics at Western Health:

Western Health provides the following Specialist Clinics for patients who require assessment and management of Metabolic Bone Disorders. Patients will be triaged by medical professionals into management pathways according to specific clinical requirements:

Conditions not seen by Metabolic Bone Disorder Specialists at Western Health:

- Osteopenia without minimal trauma fracture(s).*
- DXA defined Osteoporosis (T score <-2.5) **without** minimal trauma fracture(s) in adults >50 years who have not already undertaken three years of osteoporosis treatment* (unless treatment not tolerated).
- DXA defined Osteoporosis and T-score >3.0 **with** one minimal trauma fracture in adults >50 years who have not already undertaken three years of osteoporosis therapy*.

*Refer to RACGP-Healthy Bones Australia **Osteoporosis risk assessment, diagnosis and management flow chart** (<https://www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-racgp-guidelines/osteoporosis/osteoporosis-risk-assess-diagnosis-and-management>)

Metabolic Bone Disorder Alarm Symptoms:

- Declining bone density despite treatment.
- Fragility fracture on >12months of osteoporosis treatment.
- Severe osteoporosis with T-score <-3.0 and a minimal trauma fracture.
- Aromatase Inhibitor Therapy with T-score <-1.5.
- Androgen Deprivation Therapy with T-score <-1.5

Access & Referral Priority Metabolic Bone Disorder:

The clinical information provided in your referral will determine the triage category. The triage category will affect the timeframe in which the patient is offered an appointment.

URGENT Appointment timeframe 30 days.	ROUTINE Appointment timeframe greater than 30 days, depending on clinical need.
• Hypercalcaemia • Hypocalcaemia • Hypophosphataemia	• Suspected metabolic bone disease that is not osteoporosis. I.e: - Paget's disease - Fibrous Dysplasia - Osteomalacia - Osteogenesis imperfecta - X-linked Hypophosphataemia - Hypophosphatasia - Recurrent renal stones • Osteoporosis associated with: - Treatment with glucocorticoids - Chronic kidney disease - Post-transplant - Aromatase inhibitor therapy - Androgen deprivation therapy • Osteoporosis

Condition Specific Referral Guidelines:

Key information enables Western Health to triage patients to the correct category and provide treatment with fewer visits to specialist clinics, creating more capacity for care. If key information is missing, you may be asked to return the referral with the required information.

Condition:	Key Information Points:	Clinical Investigations:
All Metabolic Bone Disorders	- Details of presentation and diagnosis - Details of all fractures and whether trauma related - Previous medical management including course & outcome of treatment - Current medication list - Past medical history	Recent (preferably in last 3 months): - Serum calcium and phosphate - Serum 25-hydroxy vitamin D (25(OH)D) - Urea, creatinine and electrolytes - Serum Albumin - Alkaline phosphate (ALP) - Liver Function Tests Bone density within last 12 months <i>Provide if available:</i> - previous bone densitometry reports - radiological reports of current or past fractures - Parathyroid (PTH) hormone levels
Osteoporosis	- Details of presentation and diagnosis - Details of all fractures and whether trauma related - Previous medical management including course & outcome of treatment - Current medication list - Past medical history	Recent (preferably in last 3 months): - Serum calcium and phosphate - Serum 25-hydroxy vitamin D (25(OH)D) - Urea Creatinine and electrolytes - Liver Function Tests - Serum Albumin Bone density within last 12 months <i>Provide if available:</i> - Previous bone densitometry reports - Radiological reports of current or past fractures

How to refer to outpatient services

Adult Specialist Clinics

- Phone: 03 8345 6856
- Fax: 03 8345 6490

<https://westernhealth.org.au/health-professionals/referrals/how-refer>

The Endocrinology team can also be contacted via switch if you wish to provide direct handover regarding a patients care

How to refer for DXA

Western Health Bone Densitometry

- Phone: 03 8395 8270
- Fax: 03 9923 6624

Or scan and email to dxa@wh.org.au

The Endocrinology team can also be contacted via switch if you wish to provide direct handover regarding a patients care

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Questions?

Measuring outcomes for today

To obtain Measuring Outcomes hours for this session use the RACGP's Measuring Outcomes Tool.

Follow these five steps:

1. Log-in to myCPD
2. At very top of myCPD, click on 'Log'
3. From drop-down menu, click on 'Measuring Outcomes Tool'
4. Complete the form
5. Once you have completed the form, go to top of form and click 'Submit'



Thank you for attending. What's next?

After this session you will receive:

1 Slides, resources and the recording of this session within the week.

2 RACGP CPD hours will be uploaded within 14 days.

3 Attendance certificate will be received within 4-6 weeks.

- **Register for more education sessions here:**
nwmpnhn.org.au/resources-events/events
- **Past education sessions can be found here:**
nwmpnhn.org.au/resources-events/resources

Feedback - QR code

We welcome your feedback.
Let us know if you got what
you needed from this session.

