SOUTHERN RIVER COLLEGE

ATAR HUMAN BIOLOGY YEAR 11

NAME \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

TASK 8: OSTEOPOROSIS AND OSTEOARTHRITIS EXTENDED RESPONSE–

PART 2 IN CLASS VALIDATION ASSESSMENT (42 marks)

Students will answer questions on Osteoporosis and Osteoarthritis based on research with respect to the cause, effects, technology for treatments and any side effects. Students complete the In-Class validation task without using their notes.

Marking key for sample assessment task 8 — Unit 1

**Part 1: Research notes - 5 marks**

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| --- | --- |
| **Description** | **Mark** |
| Causes and symptoms of osteoporosis | 1 |
| Causes and symptoms of osteoarthritis | 1 |
| Effect of osteoporosis and osteoarthritis on the bones/joints | 1–2 |
| Current medical technology used for treatment of osteoporosis and osteoarthritis | 1 |
| **Total** | **/5** |

**Part 2: In-class assessment – 37 marks**

1. Distinguish between osteoporosis and osteoarthritis.

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| **Description** | **Mark** |
| Osteoarthritis = loss/wearing away of cartilage at joints | 1 |
| Osteoporosis = loss of calcium/bone density/weakening of bones | 1 |
| **Total** | **/2** |

1. Osteoporosis is more common among women than men. In Australia 5.5% of women, compared to 1.2% of men, have osteoporosis.
2. Describe, in terms of bone structure, how osteoporosis develops and explain why women are more likely to be affected by osteoporosis than men.

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| **Description** | **Mark** |
| Bones lose minerals  Bone breakdown/resorption occurs faster than new bone formation  Bone density decreases  Bones become more porous and fragile | 1–4 |
| Sex hormones oestrogen and testosterone help maintain bone formation | 1 |
| Men develop greater bone density than females during development | 1 |
| Oestrogen levels decrease rapidly during menopause  which results in rapid increase in bone loss | 1–2 |
| Testosterone gradually decreases over time with age  therefore increase in bone loss is gradual over time | 1–2 |
| **Total** | **/10** |

1. List three risk factors for increased likelihood of being affected by osteoporosis and how it is diagnosed in Australia.

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| **Description** | **Mark** |
| Any of the following risk factors:   * low calcium intake * low vitamin d levels * low hormone levels/women – early menopause/men – low testosterone * low levels of physical activity * smoking * excessive alcohol intake * high intake of corticosteroids | 1–3 |
| Any of the following:   * bone density scan * dual-energy absorptiometry (DXA) scan | 1 |
| **Total** | **/4** |

1. Describe one form of treatment and any associated risks or side effects.

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| **Description** | **Mark** |
| Treatment for osteoporosis should include safe exercise program – including modified strength training and safe weight bearing | 2 |
| Treatment for osteoporosis should include fall prevention – including exercise to improve balance, trip proof home, wearing hip protector, wearing sturdy footwear | 2 |
| Treatment for osteoporosis should include a diet/supplements rich in calcium and vitamin D | 2 |
| Any one of the following medication treatments with associated risk  two marks for treatment; two marks for risks (not all risks need to be included) | |
| **Treatment**  Bisphosphonate – most commonly used for initial treatment, Bisphosphonates tablets taken regularly to help reduce bone breakdown  **Risks/side effects**  May cause stomach upset, ulcers and rarely cancer, pain in bones and joints and can cause jawbone decay/osteonecrosis (rarely) | 1–4 |
| **Treatment**  Denosumab – 6 monthly injection works differently to bisphosphonate but has same results  **Risks/side effects**  Numbness/tingling in fingers, muscle cramps/aches, seizures, skin infection/itchy dry skin, back muscle or bone pain, joint pain of knees, hips and spine, high cholesterol, stomach pain/nausea |
| **Treatment**  Strontium renalate – sachet dissolved in water absorbed in similar way to calcium. Helps increase bone formation and decrease bone loss. For treatment of severe established osteoporosis  **Risks/side effects**  Increased risk of cardiovascular disease, seizure, loss of consciousness, very rare life threatening rashes toxic epidermal necrolysis (TEN), Stevens-Johnson syndrome (SJS) and severe hypersensitivity reactions (DRESS) |
| **Treatment**  Selective oestrogen modulators (SERMs) – SERMS mimic oestrogen to help reduce rate of bone loss.  **Risks/side effects**  Potential side effects include hot flushes and a slightly increased risk of deep vein thrombosis |
| **Treatment**  Hormone replacement therapy (HRT)/testosterone therapy – artificial supplementation of sex hormones to reduce rate of bone loss  **Risks/side effects**  Breakthrough bleeding, breast tenderness, bloating, nausea. Small chance of increased risk of cardiovascular disease/stroke/deep vein thrombosis/endometrial cancer |
| **Treatment**  Parathyroid hormone – daily injections of PTH, regulates the amount of calcium, phosphorus and magnesium. Helps increase bone density. For severe cases of osteoporosis  **Risks/side effects**  Nausea, leg cramps, dizziness |
| **Total** | **/10** |

1. In 2007–08 an estimated 7.6% of all Australians (1.6 million people) had osteoarthritis.
2. Describe the common symptoms of osteoarthritis and provide the main causes of osteoarthritis.

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| **Description** | **Mark** |
| **Common symptoms**  Pain and stiffness in joints | 2 |
| **Common causes**  Previous joint injuries, overweight, occupations requiring repetitive use of joints | 2 |
| **Total** | **/4** |

1. Describe the process of diagnosis for osteoarthritis and the most common treatment.

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| **Description** | **Mark** |
| **Diagnosis** formed through presence of symptoms and physical examination | 2 |
| Plus at least one of the following:  x-rays may show narrowing/disfiguring of joint but are not conclusive  blood test used to rule out other forms of arthritis | 1 |
| **Treatment** usually includes:   * a form of pain relief such as paracetamol, * non-steroidal anti-inflammatory drugs (NSAIDs) * gentle exercise program * weight loss program if cause is from being overweight * joint replacement surgery if no other treatments are effective for pain management | 1–4 |
| **Total** | **/7** |