

RU RMT 17 Endocrinology

# Gonadal, Reproductive and Life-Stage Endocrinology, and Integrative Treatment Planning

*Lecture 06 of 06*

Registered Massage Therapy Diploma Program · RU RMT 17 Endocrinology

Aligned to FOMTRAC Inter-Jurisdictional Practice Competencies (2016), CMTO Standards of Practice, and the Regulated Health Professions Act, 1991

Prerequisites: Lectures 01 to 05 · This lecture also serves as the course capstone on treatment planning



- **Two purposes:**
- The first two-thirds of the day complete the endocrine system by covering the gonads, pregnancy, puberty, menopause and aging. The final third is the course capstone, in which you assemble everything from Lectures 01 to 06 into a single treatment-planning framework.
- **Professional conduct in this material:**
- Reproductive health is sensitive. Discuss it in clinical language, obtain explicit consent for any treatment near sensitive areas, and record only what is clinically relevant.
- **Anatomical scope:**
- This lecture covers reproductive anatomy only to the extent needed to understand hormone production and its effects on the tissues you treat.
- **Practical weight:**
- Pregnancy massage, menopausal bone loss and cycle-related pain are among the most common reasons endocrine knowledge changes a treatment plan in general practice.
- **Assessment note:**
- The capstone framework in Section 6 is the organizing structure for the course assessment. Learn it as a process, not as a list.



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## **Learning Objectives (1 of 2)**

- By the end of this session, the student will be able to:
  - Trace the hypothalamic-pituitary-gonadal axis in both sexes and explain the role of inhibin.
  - Describe the endocrine functions of the ovary, including estrogen, progesterone, inhibin and relaxin.
  - Describe the ovarian and uterine cycles and correlate hormone levels with the phases of each.
  - Explain the LH surge as the principal physiological example of positive feedback in an endocrine axis.
  - Describe the endocrine function of the testis and the effects of testosterone on muscle, bone and connective tissue.
  - Outline the endocrine changes of pregnancy and their musculoskeletal consequences.



- Describe the endocrine changes of puberty, menopause and aging and their effects on bone, muscle and connective tissue.
- Describe the pathophysiology and clinical features of polycystic ovary syndrome, endometriosis, dysmenorrhea, premenstrual syndrome and hypogonadism.
- State evidence-informed positioning, pressure and safety modifications for massage during pregnancy and the postpartum period.
- Explain the effects of anabolic steroid use on connective tissue and endocrine function.
- Apply an integrated five-step framework to construct an endocrine-informed treatment plan.
- Document endocrine findings, modifications, consent and referral in accordance with the CMTO Standards of Practice.

## Reproductive endocrinology

- **Gonadotropin:**
- FSH or LH, the pituitary hormones acting on the gonads.
- **GnRH:**
- Gonadotropin-releasing hormone from the hypothalamus.
- **Graafian follicle:**
- The mature ovarian follicle that ruptures at ovulation.
- **Corpus luteum:**
- The structure formed from the ruptured follicle; secretes progesterone.
- **Inhibin:**
- A gonadal hormone that selectively suppresses FSH.
- **Relaxin:**
- A hormone of pregnancy increasing ligamentous laxity.
- **hCG:**
- Human chorionic gonadotropin, secreted by the early embryo and placenta.

## Life stage and pathology

- **Menarche:**
- The first menstrual period.
- **Menopause:**
- Permanent cessation of menstruation, confirmed after twelve consecutive months.
- **Perimenopause:**
- The transitional years of fluctuating hormone levels preceding menopause.
- **Hypogonadism:**
- Deficient sex hormone production from gonadal or pituitary failure.
- **Dysmenorrhea:**
- Painful menstruation.
- **Endometriosis:**
- Endometrial-like tissue growing outside the uterus.
- **Sarcopenia:**
- Age-related loss of skeletal muscle mass and function.



## Section 1

# The Hypothalamic-Pituitary-Gonadal Axis

- The shared architecture in both sexes
- FSH, LH and inhibin
- Why the gonadal axis is the exception to the negative feedback rule

# The Gonadal Axis

- **Tier 1:**
- The hypothalamus secretes gonadotropin-releasing hormone in pulses. The pulse frequency itself carries information, and continuous rather than pulsatile delivery paradoxically shuts the axis down.
- **Tier 2:**
- GnRH stimulates the anterior pituitary to release follicle-stimulating hormone and luteinizing hormone.
- **Tier 3 in the female:**
- FSH promotes maturation of ovarian follicles and estrogen production; LH triggers ovulation and formation of the corpus luteum, which secretes progesterone.
- **Tier 3 in the male:**
- FSH acts on the sustentacular (Sertoli) cells to support spermatogenesis; LH acts on the interstitial (Leydig) cells to produce testosterone.
- **The feedback arm:**
- Estrogen, progesterone and testosterone inhibit both the pituitary and the hypothalamus. Inhibin, produced by the ovarian follicle and by the sustentacular cells, selectively suppresses FSH without affecting LH.
- **Why inhibin exists:**
- It permits independent control of the two gonadotropins, so that gamete production and hormone production can be regulated separately.
- **Before puberty:**
- The axis is quiescent because GnRH pulses are suppressed. Puberty begins when pulsatile GnRH secretion resumes.



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# The Exception: Positive Feedback in the Gonadal Axis

- **The general rule:**
- Throughout the endocrine system, a rising peripheral hormone inhibits the pituitary and hypothalamus. This is true of the thyroid and adrenal axes without exception.
- **The exception:**
- For a brief period in the late follicular phase, sustained high estrogen from the dominant follicle switches from inhibiting the pituitary to stimulating it.
- **The result:**
- A sharp, large surge of luteinizing hormone over approximately twenty-four to thirty-six hours.
- **The consequence:**
- The LH surge triggers rupture of the mature follicle and release of the oocyte — ovulation.
- **How the loop terminates:**
- Ovulation itself removes the follicle. The structure that remains, the corpus luteum, secretes progesterone, which restores normal negative feedback inhibition.
- **Why this is examinable:**
- It is the clearest physiological example of positive feedback in an endocrine axis, and it demonstrates that positive feedback terminates through an external event rather than by shutting itself off.
- **Practical application:**
- Ovulation predictor kits detect the LH surge in urine. Basal body temperature rises by a few tenths of a degree after ovulation, under the influence of progesterone.

## Section 2

# Ovarian Endocrinology and the Reproductive Cycle

- Ovarian structure and follicular development
- Estrogen, progesterone, inhibin and relaxin
- The ovarian cycle and the uterine cycle
- Correlating hormone levels with cycle phases



# The Ovary as an Endocrine Gland

- **Position and structure:**
- Each ovary lies in a shallow fossa on the lateral pelvic wall, attached by the ovarian ligament and the mesovarium. An outer cortex containing follicles at various stages surrounds an inner medulla of connective tissue, vessels and nerves.
- **Follicular reserve:**
- All primordial follicles are present from before birth. Their number declines throughout life, and this decline, not a failure of the pituitary, is what ends reproductive capacity at menopause.
- **Estrogen:**
- Secreted mainly by the developing follicle. It drives maturation of the reproductive organs and secondary sex characteristics, thickens the endometrium, and — critically for massage therapy — restrains osteoclast activity and so maintains bone density.
- **Progesterone:**
- Secreted mainly by the corpus luteum after ovulation. It prepares and maintains the endometrium for implantation, raises basal body temperature and relaxes smooth muscle.
- **Inhibin:**
- Suppresses FSH, preventing further follicles from maturing once one has been selected.
- **Relaxin:**
- Rises in pregnancy. It softens the pubic symphysis and pelvic ligaments in preparation for delivery, and increases ligamentous laxity more generally.

- **Central clinical fact for this course:**

RU RMT 17 Endocrinology · Lecture 06 · Ruhani College · Sources: Waugh & Grant (2018); Marieb & Hoehn (2019); Werner (2019); Osborne (2012); CMTO Standards of Practice

- Estrogen is a bone-protective hormone. Any state of prolonged low estrogen — menopause, premature ovarian insufficiency



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# The Reproductive Cycle — Ovarian and Uterine Events

| Phase (approximate days)                 | Ovarian event                                                                    | Uterine event                                                                    | Dominant hormones                               |
|------------------------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------------------------------------|
| Menstrual, days 1 to 5                   | A new cohort of follicles begins to develop under FSH                            | The functional layer of the endometrium is shed                                  | All ovarian hormones low; FSH beginning to rise |
| Proliferative (follicular), days 6 to 14 | One dominant follicle matures and secretes rising estrogen                       | The endometrium regenerates, thickens and becomes vascular                       | Estrogen rising; inhibin suppressing FSH        |
| Ovulation, about day 14                  | The LH surge ruptures the mature follicle and releases the oocyte                | The endometrium is at full thickness; cervical mucus becomes thin and elastic    | LH surge; estrogen peak                         |
| Secretory (luteal), days 15 to 28        | The corpus luteum forms and secretes progesterone with some estrogen and inhibin | Endometrial glands secrete; the lining becomes receptive to implantation         | Progesterone dominant; estrogen present         |
| If fertilization does not occur          | The corpus luteum degenerates                                                    | Hormone withdrawal causes the functional layer to be shed, beginning a new cycle | Progesterone and estrogen fall sharply          |
| If fertilization occurs                  | The corpus luteum is maintained by hCG from the embryo                           | The endometrium is retained and implantation proceeds                            | hCG rises; progesterone maintained              |

*Cycle length varies between individuals and between cycles. The luteal phase is the more consistent portion, at approximately fourteen days; variation in total cycle length arises mainly in the follicular phase. Adapted from Waugh & Grant (2018) and Marieb & Hoehn (2019).*

- **Dysmenorrhea:**
- Painful menstruation caused by prostaglandin-mediated uterine contraction and ischemia. Primary dysmenorrhea has no underlying pathology; secondary dysmenorrhea does, and worsening or new pain in an older patient warrants referral.
- **What may help:**
- General relaxation-focused treatment, work on the lumbosacral region, hip and abdominal musculature within tolerance, and warmth applied to the low back or abdomen. Abdominal work requires explicit informed consent recorded in the file.
- **Premenstrual syndrome:**
- Physical and mood symptoms in the luteal phase, resolving with menstruation. Breast tenderness, fluid retention, headache, fatigue, low mood and irritability are common. Premenstrual dysphoric disorder is the severe form and is a medical diagnosis.
- **Practical adjustment:**
- Where breast tenderness or fluid retention is significant, adjust prone positioning and reduce pressure over the thorax during those days.
- **Endometriosis:**
- Endometrial-like tissue outside the uterus, responding to cyclical hormone change and causing inflammation, adhesions, severe pain and reduced fertility. Diagnosis is frequently delayed by many years.
- **Massage in endometriosis:**
- Not curative, but of genuine value for the secondary muscular pain, guarding and pelvic and lumbar dysfunction that accompany it. Work within tolerance, avoid deep abdominal pressure over painful areas, and never suggest that treatment will resolve the disease.



- **Definition:**
- A common endocrine and metabolic condition characterized by irregular or absent ovulation, clinical or biochemical androgen excess, and, in many patients, characteristic ovarian appearance on ultrasound (Teede et al., 2018).
- **Endocrine features:**
- Raised androgens, frequently disordered gonadotropin secretion, and insulin resistance in a large proportion of patients.
- **Clinical presentation:**
- Irregular or absent periods, difficulty conceiving, excess hair growth in an androgen distribution, acne, scalp hair thinning, and weight gain that is difficult to lose.
- **Metabolic significance:**
- Insulin resistance carries a substantially increased risk of type 2 diabetes, gestational diabetes, dyslipidemia, hypertension and metabolic syndrome. It is a metabolic condition, not only a reproductive one.
- **Why this matters for treatment planning:**
- A patient with polycystic ovary syndrome should be screened for the diabetes-related precautions in Lecture 05, and asked about blood pressure.
- **Massage implications:**
- No specific contraindication. Treatment addresses associated musculoskeletal complaints and stress. Where the patient is also diabetic or pre-diabetic, apply those precautions.
- **Communication:**
- **Excess hair growth and weight are sensitive. Do not comment on appearance. Record only what is clinically necessary.**



## Section 3

# Testicular Endocrinology

- Testicular structure and the two functional cell populations
- Testosterone and its effects on muscle, bone and connective tissue
- Male hypogonadism and age-related decline
- Anabolic steroid use and its consequences for the tissues you treat



# The Testis as an Endocrine Gland

- **Position:**
- In the scrotum, outside the body cavity, maintaining a temperature approximately two to three degrees below core temperature, which is necessary for normal spermatogenesis.
- **Interstitial (Leydig) cells:**
- Lie between the seminiferous tubules and produce testosterone under the stimulation of luteinizing hormone.
- **Sustentacular (Sertoli) cells:**
- Line the seminiferous tubules, support developing sperm under the influence of FSH, and produce inhibin.
- **Testosterone effects at puberty:**
- Growth of the reproductive organs, deepening of the voice, growth of body and facial hair, closure of the epiphyseal plates after an initial growth spurt, and increased skeletal muscle mass.
- **Testosterone effects in adult life:**
- Maintenance of muscle mass and strength, maintenance of bone density, red blood cell production, libido and mood.
- **Age-related change:**
- Testosterone declines gradually from about the fourth decade, typically by around one per cent per year. Unlike menopause this is a slow decline rather than an abrupt cessation, and reproductive capacity is often retained.
- **Consequences of the decline:**
- Contributes to sarcopenia, reduced bone density and reduced exercise capacity — all directly relevant to the older male patients in your practice.



# Hypogonadism and Anabolic Steroid Use

## Male hypogonadism

- **Primary:**
- The testis itself fails, from injury, infection such as mumps orchitis, chemotherapy, radiotherapy, or a genetic condition. LH and FSH are high because feedback is lost.
- **Secondary:**
- The pituitary or hypothalamus fails, so LH and FSH are low along with testosterone.
- **Presentation in the adult:**
- Reduced libido, erectile dysfunction, fatigue, loss of muscle mass and strength, increased body fat, reduced body hair, low mood, and reduced bone density.
- **Treatment planning:**
- Reduced bone density calls for graded pressure and no joint mobilization. Reduced muscle mass and exercise capacity call for moderate intensity and realistic expectations for recovery.
- **Communication:**
- These symptoms are personal. Record only what affects treatment, and keep the discussion clinical.

## Anabolic-androgenic steroid use

- **What it is:**
- Use of synthetic testosterone derivatives, usually at doses far above physiological, to increase muscle mass and performance.
- **Endocrine effect:**
- Suppression of the patient's own gonadal axis through negative feedback, with testicular atrophy and reduced natural testosterone production that may persist after stopping.
- **Connective tissue effect:**
- Muscle mass and strength increase faster than tendon adapts, and tendon quality may itself be impaired. Tendon rupture, particularly of the pectoralis major, biceps and Achilles, is a recognized association.
- **Other effects:**
- Acne, hypertension, adverse lipid changes, mood disturbance and aggression, liver strain with oral preparations, and reduced fertility.
- **Treatment planning:**
- Treat tendon complaints in these patients conservatively. Do not apply aggressive cross-fibre friction or forceful stretching to a tendon that may be structurally compromised.



## Section 4

# Pregnancy, Puberty, Menopause and Aging

- The endocrine changes of pregnancy and their musculoskeletal consequences
- Massage during pregnancy and the postpartum period
- Puberty
- Menopause and postmenopausal bone loss
- The aging endocrine system



# The Endocrine Changes of Pregnancy

- **Human chorionic gonadotropin:**
  - Secreted by the early embryo and then the placenta. It maintains the corpus luteum so that progesterone production continues until the placenta takes over at around three to four months. It is the hormone detected by pregnancy tests.
- **Progesterone:**
  - Maintains the endometrium and suppresses uterine contraction, allowing the uterus to stretch as the fetus grows. It also relaxes smooth muscle generally, contributing to reflux, constipation and venous distensibility.
- **Estrogen:**
  - Rises steadily, promoting growth of the uterus and breast tissue and increasing uterine sensitivity to oxytocin toward term.
- **Relaxin:**
  - Softens the pubic symphysis and pelvic ligaments and increases ligamentous laxity more generally, contributing to pelvic girdle pain and to a sense of joint instability.
- **Oxytocin:**
  - Rises at term and drives labour through the positive feedback loop described in Lecture 03.
- **Prolactin:**
  - Rises through pregnancy but its action on the breast is blocked by high estrogen and progesterone until those fall after delivery, permitting lactation to begin.
- **Other systemic changes:**
  - Blood volume increases substantially, the coagulation system shifts toward clotting, and postural changes follow the growing uterus. All three change how you position and treat.



# Massage in Pregnancy — Practical Guidance

## Positioning and technique

- Side-lying with full pillow support is the standard position from the second trimester onward, with support under the head, upper arm, abdomen and upper leg.
- Avoid prolonged supine positioning in later pregnancy, since the uterus can compress the inferior vena cava and reduce venous return. A semi-reclined position is an alternative.
- Prone positioning becomes impractical as pregnancy advances; pregnancy cushions and tables with abdominal cut-outs require careful evaluation and are not universally recommended.
- Use moderate pressure. Increased ligamentous laxity means joints reach end range more easily and are less well protected, so avoid end-range stretching and joint mobilization.
- Expect pelvic girdle pain, low back pain, thoracic and cervical strain from breast enlargement and postural change, and calf cramping.
- Obtain and record specific informed consent for the areas to be treated and for the positioning used (Health Care Consent Act, 1996).

## Safety and referral

- Deep vein thrombosis risk is increased in pregnancy and the postpartum period. Unilateral calf pain, swelling, warmth or redness is an urgent referral, and the limb must not be massaged.
- Refer promptly for vaginal bleeding, leakage of fluid, severe or persistent headache, visual disturbance, sudden swelling of face and hands, upper abdominal pain, or markedly reduced fetal movement. Several of these can indicate pre-eclampsia.
- A history of pre-eclampsia, gestational diabetes, placental problems, a high-risk pregnancy or a multiple pregnancy warrants confirmation with the patient's maternity care provider before treatment.
- Avoid intense heat applications and avoid hot tubs and saunas in pregnancy.
- Do not make claims about inducing labour, turning a breech presentation, or influencing the pregnancy itself.
- **Postpartum:**
- Ligamentous laxity persists for some months, and continues longer with breastfeeding. Maintain the laxity precautions beyond delivery.

- **The trigger:**
- Puberty begins when the hypothalamus resumes pulsatile secretion of GnRH after a quiescent childhood. The precise initiating signal is complex and involves body composition, nutrition, leptin signalling and genetic factors.
- **In the female:**
- Breast development, growth of pubic and axillary hair, the pubertal growth spurt, widening of the pelvis, increased subcutaneous fat, and menarche, typically between the ages of about twelve and fourteen.
- **In the male:**
- Growth of the testes and penis, growth of pubic, axillary and facial hair, deepening of the voice, and a later and larger growth spurt with increased muscle mass.
- **The growth spurt and its end:**
- Sex hormones first accelerate long bone growth and then close the epiphyseal plates, ending linear growth. This is why the growth spurt is self-limiting.
- **Musculoskeletal relevance:**
- Rapid growth outpaces the adaptation of muscle and tendon, producing the traction apophysitis conditions common in adolescent athletes, such as Osgood-Schlatter disease at the tibial tuberosity and Sever's disease at the calcaneus.
- **Treatment planning in adolescents:**
- Work conservatively near growth plates and apophyses, avoid aggressive stretching of tight structures around them, and refer persistent bone pain in a growing child rather than treating it repeatedly.

- **Consent and professional conduct:**

- Treating a minor requires consent from a parent or guardian and adherence to CMTO requirements. Follow your clinic policy



# Menopause

- **Definition:**
- Permanent cessation of menstruation, confirmed retrospectively after twelve consecutive months without a period. It occurs most commonly between the ages of about 45 and 55.
- **Underlying cause:**
- Depletion of the ovarian follicular reserve. With fewer follicles, estrogen and inhibin fall, feedback inhibition is lost, and FSH and LH rise substantially.
- **Perimenopause:**
- The transition, which may last several years, during which hormone levels fluctuate irregularly and cycles become unpredictable. Symptoms are often at their most disruptive during this phase rather than after it.
- **Vasomotor symptoms:**
- Hot flushes and night sweats, caused by altered hypothalamic thermoregulation. Night sweats fragment sleep, which contributes to fatigue, low mood and impaired tissue recovery.
- **Other features:**
- Genitourinary changes, altered mood and sleep, and changes in skin and hair.
- The change with the greatest relevance to massage therapy: Bone loss accelerates markedly in the first five to ten years after menopause because estrogen no longer restrains osteoclast activity. Postmenopausal osteoporosis is a direct consequence.
- **Other long-term changes:**
- Cardiovascular risk rises to approach that of men of the same age, and body composition shifts toward central fat with loss of lean mass.

- **Treatment planning:**



- **Growth hormone:**
- Declines steadily through adult life, contributing to reduced lean mass, increased fat mass and slower tissue repair.
- **Sex hormones:**
- Estrogen falls abruptly at menopause; testosterone declines gradually in men. Both contribute to loss of bone density and muscle mass.
- **Thyroid:**
- Function is generally preserved, but the prevalence of hypothyroidism rises with age and symptoms are easily mistaken for normal aging.
- **Glucose regulation:**
- Insulin sensitivity declines and the prevalence of type 2 diabetes rises markedly with age.
- **Adrenal cortex:**
- Cortisol secretion is broadly maintained, but the diurnal rhythm flattens and recovery from a stressor is slower. Adrenal androgen production falls steadily.
- **Melatonin:**
- Secretion declines, contributing to the lighter, more fragmented sleep common in older adults, which in turn reduces the nocturnal growth hormone pulse and slows healing.
- **The composite picture:**
- An older patient may have reduced bone density, reduced muscle mass, thinner skin, impaired thermoregulation, slower healing, altered glucose regulation and disturbed sleep simultaneously. Each of these is an endocrine consequence, and together they explain why treatment for an older adult is modified in pressure, positioning, duration, hydrotherapy and

Section 5

# **The Pineal Gland, Circadian Rhythm and Healing**

- Melatonin and the circadian system
- Sleep, growth hormone and tissue repair
- Shift work and the patients it produces



# Circadian Rhythm, Sleep and Tissue Repair

- **The circadian system:**
- The suprachiasmatic nucleus of the hypothalamus is the master clock, entrained principally by light reaching the retina. It sets the timing of melatonin, cortisol, growth hormone and body temperature.
- **Melatonin:**
- Rises in darkness and falls with light exposure, promoting sleep onset. Evening exposure to bright light, particularly short-wavelength light from screens, suppresses it.
- **Cortisol:**
- Peaks shortly after waking, providing the rise in available fuel that supports the start of the day.
- **Growth hormone:**
- The largest pulse occurs during slow-wave sleep, which is concentrated in the first half of the night. This is when much protein synthesis and tissue repair occurs.
- **The clinical consequence:**
- A patient whose sleep is short, fragmented or mistimed has reduced nocturnal growth hormone release and genuinely repairs soft tissue more slowly. This is a physiological explanation for slow progress, not an excuse for it.
- **Shift workers:**
- Night and rotating shift workers experience persistent misalignment between their internal clock and their schedule, associated in the literature with metabolic disturbance, weight gain, impaired glucose tolerance and increased musculoskeletal complaint.

- **What is within your scope:**

- General sleep hygiene advice — a consistent wake time, a dark and cool bedroom, reduced light exposure before bed, and

Section 6

# Capstone: Endocrine-Informed Treatment Planning

- A five-step framework
- Modification categories and how to choose between them
- Documentation, consent and referral
- Two integrative case applications



| Step                                                                                                                                                                                                                                                     | What you do                                                                                                                                                                               | What it produces                                                                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| 1. Screen                                                                                                                                                                                                                                                | Ask the endocrine screening questions and read the medication list. Ask what each medication is for and when it was last taken.                                                           | Identification of diagnosed conditions, undiagnosed patterns and current stability |
| 2. Identify the tissue consequence                                                                                                                                                                                                                       | Translate each finding into its physical effect: bone density, skin integrity, sensation, circulation, thermoregulation, blood pressure, healing rate, joint stability, glucose stability | A list of physical constraints rather than a list of diagnoses                     |
| 3. Modify                                                                                                                                                                                                                                                | Adjust pressure, technique selection, positioning, duration, hydrotherapy, appointment timing and transfers to fit those constraints                                                      | A treatment plan that is safe for this patient today                               |
| 4. Document                                                                                                                                                                                                                                              | Record findings, reasoning, modifications applied, consent obtained and outcome                                                                                                           | A defensible clinical record meeting CMTO requirements                             |
| <i>The order matters. Therapists who skip step 2 tend to memorize condition-specific protocols and are then defeated by any patient whose condition is not on the list. Translating a diagnosis into a tissue consequence is the transferable skill.</i> |                                                                                                                                                                                           |                                                                                    |
| 5. Refer and reassess                                                                                                                                                                                                                                    | Advise medical assessment for uninvestigated or deteriorating findings; record the advice; follow up at the next                                                                          | Appropriate care, continuity, and evidence of sound professional judgement         |



# Modification Categories and Their Endocrine Triggers

| Modification                                | Triggered by                                                                                            | Typical adjustment                                                                    |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|
| Reduce pressure                             | Osteoporosis; corticosteroid use; hyperparathyroidism; hyperthyroidism; hypogonadism; osteomalacia      | Light to moderate throughout; no percussion or heavy compression over the trunk       |
| Avoid friction and shearing                 | Cortisol excess; fragile skin; poor healing in diabetes                                                 | Generous lubricant; broad contact; inspect skin before and after                      |
| Avoid joint mobilization and end-range work | Reduced bone density; relaxin-related laxity in pregnancy; anabolic steroid use                         | Work within mid-range; no high-velocity technique                                     |
| Modify positioning                          | Pregnancy; kyphosis; exophthalmos; sleep apnea; orthostatic hypotension                                 | Side-lying or semi-reclined; full pillow support; slow transitions                    |
| Modify hydrotherapy                         | Impaired thermoregulation; neuropathy; peripheral vascular disease; hyperthyroidism; vasomotor symptoms | Neutral or cool applications; never heat on an insensate or ischemic limb             |
| Modify timing and duration                  | Insulin-treated diabetes; adrenal insufficiency; fatigue states; hypopituitarism                        | Coordinate with meals and medication; shorten sessions; build tolerance across visits |
| Add inspection and monitoring               | Diabetes with neuropathy; corticosteroid use; fall risk                                                 | Foot inspection each visit; skin inspection; supervised transfers                     |
| Defer or refer                              | Undiagnosed systemic pattern; acute illness; suspected crisis; new visual field loss;                   | Do not treat; advise medical assessment; document the advice and the date             |



# Documentation, Consent and Scope

- **Documentation:**
- The CMTO Standard of Practice on record keeping requires a record that supports and explains the care provided. For an endocrine patient this means recording the condition, its current stability, the specific modifications applied, the reason for each, and the outcome.
- **Why the reasoning matters:**
- A record showing that you identified a constraint and chose a modification for a stated physiological reason demonstrates competent professional judgement. A record that only lists techniques does not.
- **Consent:**
- Informed consent under the Health Care Consent Act, 1996 must be specific and ongoing. Explain in plain language what you are doing, what you are avoiding and why. Consent for sensitive areas such as the abdomen, chest wall or gluteal region must be explicit and separately recorded.
- **Privacy:**
- Health information is protected under the Personal Health Information Protection Act, 2004. Do not disclose a patient's endocrine condition to anyone, including their physician, without consent.
- Scope limits under the Regulated Health Professions Act, 1991: You may not diagnose, may not interpret laboratory results, may not advise on medication, and may not perform controlled acts not authorized to massage therapists.
- **Claims and advertising:**
- Do not claim to balance hormones, reset the endocrine system, detoxify, cure a condition, or lower cortisol. These claims are unsupported and are a professional conduct matter.



# Case Application 1 — The Postmenopausal Patient With Multiple Constraints

- **Presentation:**
- A 63-year-old woman books for persistent neck and shoulder pain. History: menopause at 51, osteoporosis diagnosed four years ago with a previous wrist fracture, hypothyroidism on levothyroxine, and prednisone taken for eight months two years ago for an inflammatory condition. She reports poor sleep with night sweats and feels the cold.
- **Step 1, screen:**
- Four endocrine findings — postmenopausal status, osteoporosis, hypothyroidism, and a previous course of corticosteroids. Ask whether the thyroid dose is stable and when levels were last checked.
- **Step 2, tissue consequences:**
- Reduced bone density from two independent causes; possible skin fragility from previous corticosteroid use; impaired thermoregulation and cold intolerance; slow tissue recovery; fragmented sleep reducing nocturnal repair; and a fall and fracture risk.
- **Step 3, modify:**
- Light to moderate pressure throughout. No cervical or thoracic joint mobilization, no rib springing, no percussion over the trunk. Side-lying or semi-reclined positioning with full support. Warm the room and the linens but avoid intense heat applications and inspect the skin. Supervise the transfer on and off the table. Standard duration, moderate intensity, with progress judged over several visits rather than one.
- **Step 4, document:**
- All four conditions, the fracture history, each modification and its reason, the consent discussion and her response to treatment.



## Case Application 2 — Pregnancy With Gestational Diabetes

- **Presentation:**

- A 34-year-old woman at 30 weeks in her second pregnancy books for low back and pelvic girdle pain. She has been diagnosed with gestational diabetes managed by diet, checks her blood glucose four times daily, and reports occasional calf cramping at night.

- **Step 1, screen:**

- Pregnancy at 30 weeks, gestational diabetes, and a musculoskeletal complaint typical of the third trimester. Ask about her maternity care, whether any complication has been identified, and when she last ate and last checked her glucose.

- **Step 2, tissue consequences:**

- Increased ligamentous laxity from relaxin; altered posture and loading; increased blood volume with a coagulation shift raising thrombosis risk; glucose instability; reduced tolerance for prolonged supine positioning; and reduced comfort in most positions.

- **Step 3, modify:**

- Side-lying with full pillow support under the head, upper arm, abdomen and upper leg. Moderate pressure. No end-range stretching or joint mobilization at the pelvis or lumbar spine. Avoid intense heat. Confirm she has eaten and keep a fast-acting carbohydrate available. Keep the session comfortable in duration with position changes as needed.

- **The calf cramping requires care:**

- Night cramping is common in pregnancy, but unilateral calf pain, swelling, warmth or redness must be screened for before any lower limb work, because deep vein thrombosis risk is increased. If present, do not massage the limb and refer urgently.

- **Step 4, document:**

- Gestational age, the diagnosis, positioning used, the DVT screening performed and its result, all modifications, consent for



- 1. Trace the hypothalamic-pituitary-gonadal axis in both sexes and state the specific role of inhibin.
- 2. Explain the LH surge as an example of positive feedback and state what terminates it.
- 3. Name the four principal ovarian hormones and state one effect of each on tissue you treat.
- 4. Correlate the four phases of the reproductive cycle with the dominant hormone in each.
- 5. Explain why prolonged low estrogen at any age accelerates bone loss.
- 6. Describe endometriosis and state what massage therapy can and cannot offer for it.
- 7. Describe the endocrine and metabolic features of polycystic ovary syndrome and state what they add to a treatment plan.
- 8. Name the two functional cell populations of the testis and the hormone associated with each.
- 9. Explain how anabolic steroid use affects tendon and state the resulting treatment modification.
- 10. Name five hormones of pregnancy and state one musculoskeletal consequence of each.
- 11. State four positioning modifications for massage in the third trimester and justify each.
- 12. List five findings in a pregnant patient that require urgent referral.
- 13. Explain the endocrine cause of menopause and the mechanism of postmenopausal bone loss.
- 14. Explain how disrupted sleep reduces soft tissue healing, naming the hormone involved.
- 15. State the five steps of the endocrine-informed treatment planning framework and explain why step 2 is the transferable skill.
- 16. List four claims about massage and the endocrine system that an RMT must not make, and state what may be said instead.

- The gonadal axis shares the architecture of the thyroid and adrenal axes, with inhibin providing selective control of FSH, and contains the one physiological example of positive feedback in an endocrine axis: the LH surge.
- Estrogen maintains bone density by restraining osteoclast activity; any prolonged low-estrogen state accelerates bone loss, and postmenopausal osteoporosis is the direct clinical consequence.
- Pregnancy is a planned state of profound endocrine change producing ligamentous laxity, altered posture, increased blood volume, a coagulation shift and glucose instability, all of which change positioning, pressure, screening and safety.
- Puberty, menopause and aging each produce identifiable tissue changes, and treatment is modified for those changes rather than for the patient's age.
- Circadian rhythm governs cortisol, growth hormone and melatonin; disrupted sleep reduces nocturnal growth hormone and genuinely slows tissue repair.
- The five-step framework — screen, identify the tissue consequence, modify, document, refer and reassess — applies to every endocrine condition in this course, including ones you have not yet met.
- The massage therapist's contribution is real but bounded: reduced pain, reduced reported stress, improved comfort and function, safe treatment adapted to physiological constraint, sound records and timely referral. It does not include diagnosis, hormonal correction or claims the evidence cannot support.

- Explain how the endocrine system maintains homeostasis, and trace both negative and positive feedback loops with all four components named.
- Name the major endocrine glands, their hormones, targets and effects, and identify the secondary endocrine tissues.
- Describe the principal endocrine pathologies of the pituitary, thyroid, parathyroid, adrenal, pancreatic and gonadal systems.
- Recognize the tissue consequences of each pathology in the skin, muscle, bone, connective tissue, nerve and circulation you work with.
- Screen a patient for endocrine risk, read a medication list, and recognize the red flags requiring referral.
- Recognize hypoglycemia, adrenal crisis, thyroid storm, suspected deep vein thrombosis and new bilateral visual field loss, and respond appropriately to each.
- Construct, justify and document an endocrine-informed treatment plan addressing pressure, technique, positioning, duration, hydrotherapy, timing, aftercare, consent and referral.
- State accurately what massage therapy can and cannot offer a patient with endocrine disease, in language that is both honest and useful.

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