



**ADVANZ HEALTH**

SPORTS MEDICINE | PHYSIOTHERAPY

**WELCOME TO THE NIFTY KNEE PROGRAM!**





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## WEEK 1

BELIEFS - Our world appears through the lenses of our beliefs. We filter all information, including physiological sensations such as pain through these beliefs and then create meaning which translates in the expression of our experience.

Write down 3 positive beliefs about your knee condition:

1.

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2.

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3.

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Write down 3 negative beliefs you have about your knee pain:

1.

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2.

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3.

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## GET LEVERAGE > CREATE HEALTHY RITUALS > MANAGE BELIEFS > LIVE A BETTER LIFE

It is our rituals which define us and therefore define our outcome.

- Consider this in the context of:
  - Time management
  - Morning routine
  - Habit shifting - away from bad to good (*consider what are some bad habits which perpetuate your knee pain that could be changed through conscious habit shifting*)

### OUR EXPECTATIONS OF YOU:

1. Commitment
2. Home exercises
3. Open sharing
4. Questions
5. Home work
6. Feedback

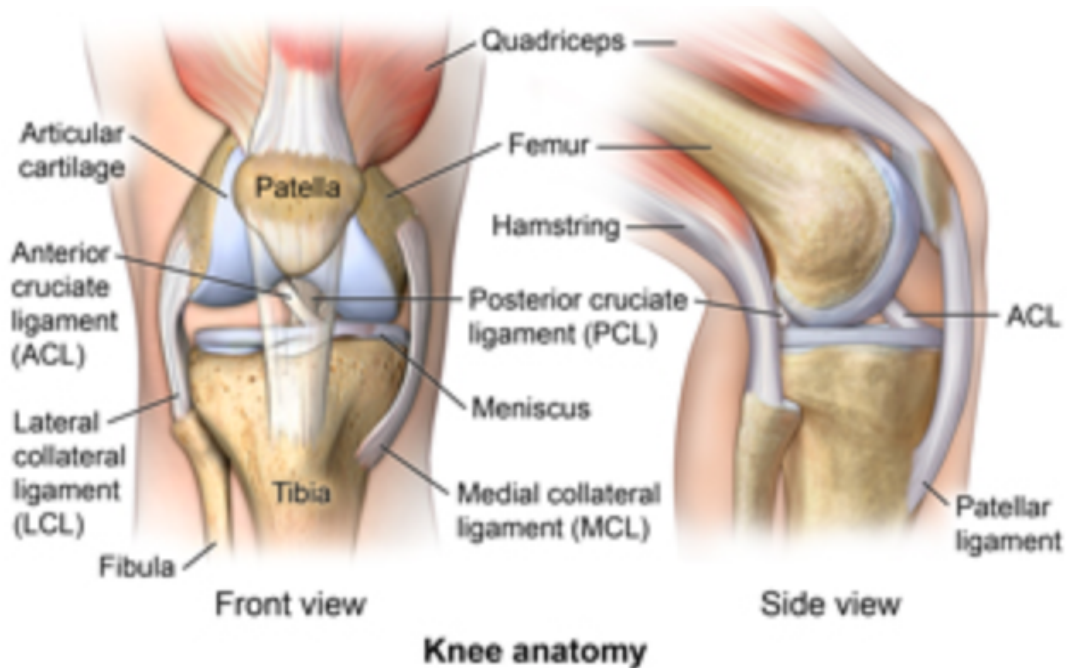


## WEEK 2

LET'S GET THE ANATOMY OUT OF THE WAY!

### Relevant Anatomy and Biomechanical Principles

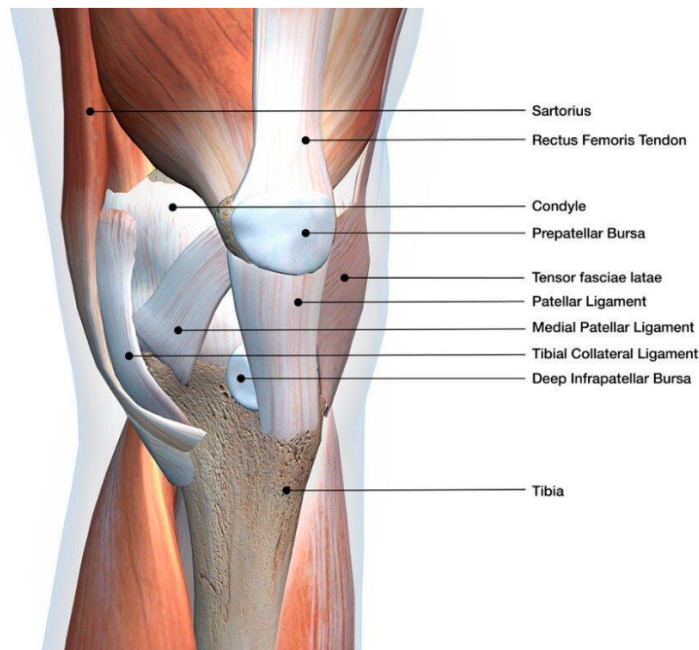
- The knee is made up of 4 bones - Femur, Patella, Tibia and Fibula
- In between the Femur and Tibia is the meniscus - a shock absorber
- Attached to these bones are various ligaments and muscles
- Around the knee is also some sacs of fluid, known as bursa's. These help reduce the friction between the bones and the muscles





## Tendons and Muscles of the knee:

- Tendons attach muscles to bones.
- Muscles provide support and stability to flex, extend and rotate the knee.
- Fascia is a strong sheath-like connective tissue that supports the muscles.
- The major muscle groups of the knee are the quadriceps, hamstrings, tibialis and calves. There is also a small muscle, the popliteus which is behind the knee



## Muscle Groups:

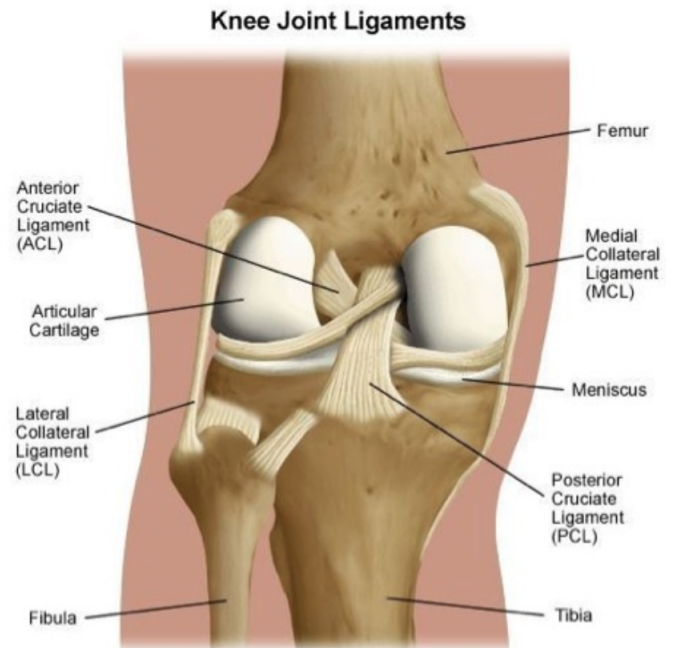
- Quadriceps:
  - As the name suggests is a muscle group of 4 muscles, Vastus medialis, vastus intermedius, vastus lateralis and rectus femoris
  - Aid in extending the knee, as well as stabilizing and preventing too much forward translation.
  - Important muscles in landing
- Hamstrings:
  - Made up of 3 muscles, Semimembranosus, Semitendinosus and Biceps Femoris.
  - Aid in flexing the knee and preventing hyperextension
  - Important muscles in running
- Groin:



- Made up of 4 muscles, Sartorius, Gracilis, Adductor Magnus and Adductor Longus.
- Aid in adduction (bringing the knee in) of the leg and knee and prevent too much internal rotation of the knee
- Important muscles in stability
- Calves:
  - Made up of 3 muscles, Gastrocnemius, Soleus, Tibialis Posterior, however only the gastrocnemius crosses over the knee
  - Aid in flexion of the knee and prevent hyperextension
  - Important muscles for power activities including running and cycling

## Ligaments of the knee:

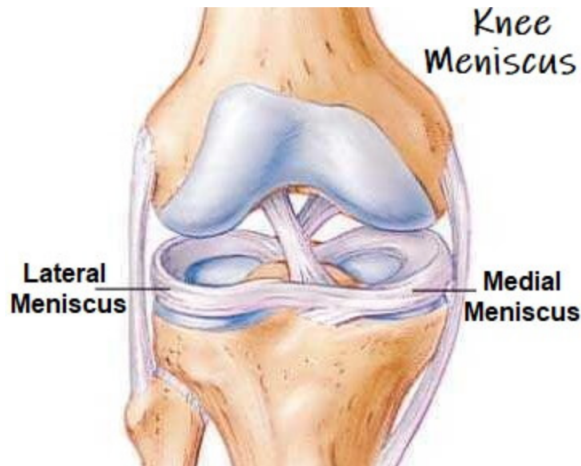
- The knee is made up of 4 main ligaments
  - Anterior Cruciate Ligament (ACL) - ligament in the centre of the knee which controls the rotation and forward movement of the tibia from the femur
  - Posterior Cruciate Ligament (PCL) - ligament located at the back of the knee that controls the backward movement of the tibia from the femur
  - Medial Collateral Ligament (MCL) - ligament on the inside of the knee which stabilises the knee and helps prevent too much inward movement of the knee
  - Lateral Collateral Ligament (LCL) - ligament on the outside of the knee which stabilises the knee and helps prevent too much outward movement of the knee





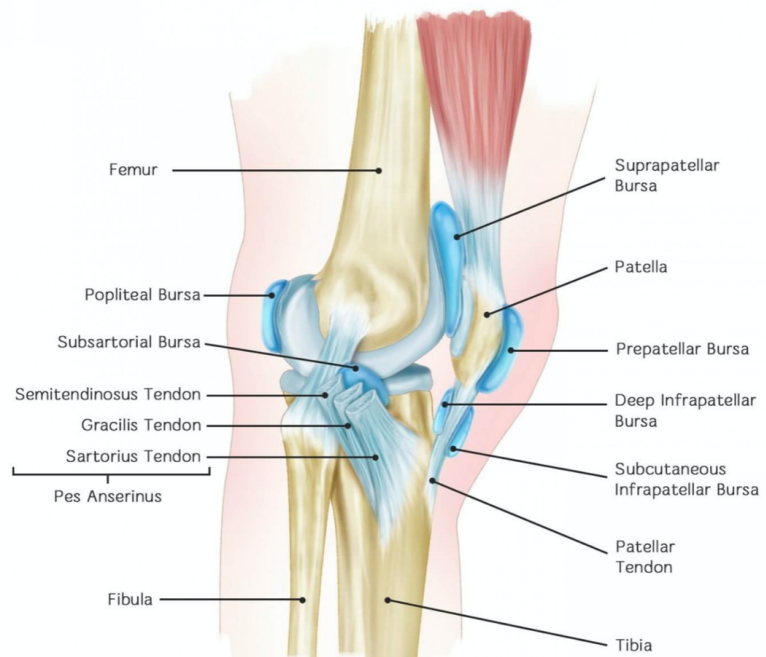
## The meniscus:

- The meniscus is a wedge like piece of soft tissue that acts as a shock absorber between the femur and the tibia. Important in jumping, landing and twisting.



## Bursae of the knee:

- The bursae are sacs of fluid, which help to stop friction between the bones and the muscles/tendons.
- If aggravated the bursa can become inflamed and swell, which can thereby put pressure onto itself, the bone or the muscle
- The bursa is also very sensitive therefore making it seem as though there may be more damage than there actually is





## WEEK 3

### Most common sources of knee pain

- Overuse
  - Knee pain can arise with overuse of particular muscles with particular exercises. A classic example is knee pain after taking up running and running 5km/day everyday with no great running history
  - Can also arise with a lot of jumping and landing
- Poor biomechanics
  - The way someone moves can drastically affect how their knee responds. If someone has poor technique in jumping and landing this can create an overuse of certain structures and thereby result in pain.
  - A classic example is knee pain in runners who overstride (take too big a step on one or each side while running)
- Poor footwear
  - Someone's footwear and therefore their ankle stability will affect the way in which the knee will move. If someone's footwear is worn away on the inside of the sole the knee is likely to collapse in and compress the inside structures of the knee
- Sex
  - Females are more likely to experience different forms of knee pain due to an increased Q-angle (the angle from the hips to the knee), thereby compressing medial structures and possibly under-utilising lateral structures

### Common Knee Conditions

- Patellofemoral Pain (PFP)
  - Refers to pain in and around the front of the knee, most noticeably in the fluid behind the knee cap. Usually feels worse with squatting, running and going up/down stairs. Often occurs due to a number of factors, such as, overload, poor biomechanics and poor strength around the knee.
- Pre-Patella Bursitis
  - When the bursa at the front of the knee gets irritated and swells up with fluid. Usually occurs when there is direct contact to the area or



constant pressure on the knee. Can also be due to an infection

- Meniscus irritation / tear
  - When the shock absorber between the two big bones of the femur and tibia is irritated. Usually occurs when someone has to make a sudden turn and the bones put too much pressure on the area and create an irritation or in some cases a tear. Usually feels worse with end of range flexion and extension, as well as turning on the affected leg
- Patella tendinopathy
  - Irritation and thickening of the tendon that connects the knee cap to the tibia (main shin bone). Usually comes about with overuse/overload in different activities like running and weights. Will find that it'll be sore in the morning but then get better as the day goes on.
- Baker's Cyst
  - Is when fluid fills at the back of the knee in the popliteal bursa. Due to its positioning people find it very hard to bend the knee. It usually occurs when there are other issues around the knee.
- ACL
  - One of the more serious knee injuries. Comes about when the forward momentum of the femur is too much to handle and therefore the ligament that attaches the femur and the tibia snaps. Usually occurs during sporting activities when changing direction quickly.
- MCL
  - The MCL can tear when the knee moves inward at a very quick rate and with high force. The force is so great that the ligament cannot withstand the pressure and tears. Common in contact sports like rugby and soccer.
- Runner's Knee
  - Otherwise known as ITB friction syndrome. It occurs when the ITB which connects to the knee is very tight and therefore pulls on the attachment and creates a pain on the outside of the knee. Common in runners, especially those with poor technique

## **Symptoms of more serious conditions**

- Numbness would indicate a possible nerve involvement and that could be from the back or around the area of concern
- Instability is usually a sign of a lax ligament





## WEEK 4

### HOW DID I GET HERE???

#### GENETICS

- Collagen makeup and its importance
  - Hyper-hypo-mobility (water or land body) - group in to hyper/hypo
- Comorbid issues, e.g other joint pathology like FAI, OA, RA, bloodborne inflam, CNS, sympathetic compression
- Remember that there is a management strategy to aid all of the above and cannot be discounted in a treatment program. Is there a missing link to your recovery?

#### OTHER INFLUENCES

- Habits - posture, biomechanics, funky habits (cross legs etc)
- Loading - alignment and control
- Prevalence of loading
- Beliefs (influence behaviours and nervous system)
- Nervous system sensitivity
- Emotions

What are the top 3 things described above that you feel are contributing to your pain?

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Sitting:

**How many hours do you sit for in a day?**

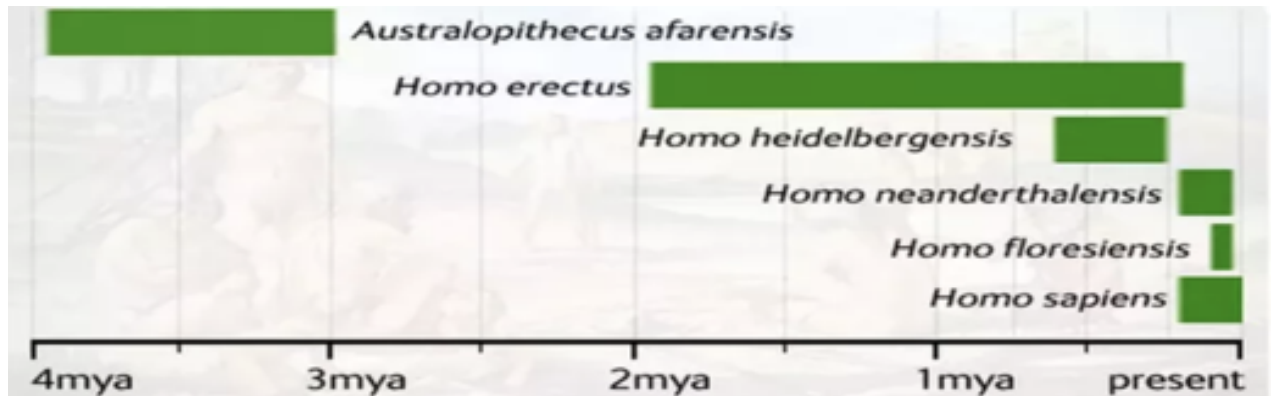
Breakfast	
Commute to work	
Morning work	
Lunch	
Afternoon work	
Commute home	



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Dinner	
Relaxing	
<b>Total Daily Sitting Time</b>	



Homo sapiens have been evolving for 200,000 years and we have evolved to move! Sitting for more than 4 hours per work day (50% of your work day) and 6 hours in total will wreak havoc on your back pain and overall health!



## WEEK 5

### Pain science

Pain is an unpleasant experience. In fact, it's bloody horrible. But it is actually an incredibly important experience that keeps you safe, informs you about danger and helps you avoid harm. Without pain, you would all be doing crazy and damaging things to your bodies without realizing it. But your pain systems don't always work perfectly.

#### Pain and the brain

Once upon a time, scientists believed that pain was a message that was sent from our body to our brains, informing us that damage had occurred. What we have now discovered is that these early scientists had it the wrong way around.

It is now well understood that pain occurs *in* the brain. It may be hard to believe, but pain doesn't actually tell you about how much you have damaged your body; it tells you about how much *danger* your brain *believes* you are in. This may be potential danger or real danger.

#### Persistent pain

In a normal and healthy pain response, all of the elements that make up your pain experience will reverse and return to normal over time, in line with the healing of the injured tissue. But sometimes, things don't behave as they should, and pain persists. There is no simple answer for why this occurs and there are often a number of different factors, each unique to the individual case.

Regardless of the reasons, the fact of the matter is that your danger alert system has malfunctioned. Whilst in a normal scenario, the level of pain will diminish as the injury heals, with chronic pain the level of pain you experience remains the same or even worsens over time, **even if the injured area is healing normally.**

**When pain becomes chronic, the pain you feel is no longer an accurate representation of danger or damage in your body.**

Summary:

- Pain is an important protective mechanism
- The level of pain we experience is determined by how much danger our brain *believes* we are in
- It does not tell us about how much damage is in the tissue
- Chronic pain is rarely an accurate assessment of danger to the body
- All of the changes in the body associated with chronic pain are reversible



## WEEK 6

### Stress & Mindfulness

Below is a list of some of the physical responses that occur during a stress response and the direct impact on pain.

<b>Fight or Flight Response</b>	<b>Impact on your back pain</b>
Rapid & shallow breathing	Rapid and shallow breathing results in less oxygen delivery, which then causes the muscles to start tensing up in order to help with lung expansion in an effort to get more oxygen. This results in tight and painful muscles due to overactivity.
Increased muscle tone	The sympathetic response causes muscle tension to assist with running or fighting, but prolonged muscle tone causes pain and impacts bony alignment.
Reduced immunity	Blood and energy is directed to the muscles instead of the immune system (to assist with escaping immediate danger) and this reduced immune energy impacts healing abilities and injury recovery.
Adrenal fatigue	Prolonged release of stress hormones (e.g. adrenaline) causes exhaustion and adrenal fatigue. This reduces tissue healing and also increases pain perception by impacting mood and emotional regulation.
Poor digestion	Similar to the immune system, blood flow and energy is directed to the muscles instead of the digestive system (to assist with escaping immediate danger). This negatively impacts absorption of nutrients and vitamins that assist with injury recovery.
Inflammation	Prolonged stress causes inflammation in the body, creating pain and poor tissue health. Inflammation occurs through poor gut health (due to digestive issues), cortisol and insulin resistance (hormonal issues) and altered immune system responses.
Hypervigilance	The fight and flight response causes increased mental alertness (to detect danger), which makes us hyper-sensitive to pain.



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## Questionnaire:

- How do you feel now compared to when you started the program?
- What have you learnt about your body?
- Do you know what makes you feel uncomfortable or what triggers pain?
- Do you have a strategy to make you feel better? Any particular exercise you have learnt so far?
- Is the pain still taking anything out of your life? Do you think you can change this?
- Has anything changed in your life since you started the program in regards to exercise routine, social life, interaction with friends and family?
- Do you feel like you are more in control of your body?



## WEEK 7

### Chronic pain and Recurrence

- Chronic pain means pain for longer than 3 months, which means pain that persists after the tissue healing time frame – central sensitization.
- Once the nervous system is sensitized the source of pain is most likely to be at the spinal cord and brain instead of tissue, but any increased load over the previously injured tissue will increase brain alert – pain (recurrency).
- 66% of people with chronic pain will have recurrency.

The most important things to remember if you have a flare up;

- The pain is not necessarily from damaged tissues, but most likely from a very sensitized nervous system. Stay strong and avoid negative thoughts about your body and your life.
- Keep moving to restore muscle coordination and maintain the deep stabilisers working well.
- Think of the exercises we have done together and pick the ones that make you feel the best to use as a 'painkiller'.
- Keep moving and doing things you enjoy as much as possible
- At this point you should be able to identify what causes the flare ups and what normally loads your back.

### Exercise progression/regression

- The more you load the more resilient the body becomes
- Neutral spinal before movement
- Supported before non- supported
- Standing – double before single legged
- Drivers and their specific loads
- Range
- Speed



## WEEK 8

### History behind Pilates Method

- Created by Joseph Pilates who was born in 1880 in Germany.
- The inspiration for his method came to him during World War One to help with military training, He developed his method for four years, working on his fellow internees.
- He suffered from asthma and rheumatic fever. He managed to overcome his physical limitations by developing his own program of exercise.
- It was initially named 'contrology'

### Principles:

- Breathing: Full consistent inhalation and exhalation helps the circulatory system nourish all tissues while carrying away impurities and metabolic waste.
- Axial elongation and core control.
- Spine articulation.
- Organization of head, neck and shoulders.
- Weight bearing and alignment of the extremities.
- Movement integration

### Main goals of Pilates for chronic knee pain:

- Better flow of communication between body – brain and vice versa
- Increase tissue tolerance and resilience.
- Unload tissues and relieve pain.
- Maintain mobility.
- Increase variability – use the same core activation in different positions without sensitizing the nervous system.
- Consolidate posture, movement, function – EVERY REP NEEDS TO BE PRODUCTIVE (precision).



## WEEK 9

### SLEEP

Sleep: failing to get 8 hours of good quality sleep every night increases your pain sensitivity, creates inflammation in the body and makes it harder for an injury to heal.

Here are some tips for getting a good night sleep:

1. **Lighting:** You now understand the impact of artificial lighting on your circadian rhythm, so as the sun sets you should dim any bright lights, turn on soft lamps and light candles. Replace any white globes with warm, low intensity globes. This will tell your brain that night time is here and begin melatonin release at the right time, meaning you'll get off to sleep easier. You should also remove any artificial lights from your bedroom such as alarm clocks, and block outside lights with black-out curtains (if you don't have any external street lights then it can be nice to leave curtains open so sunlight enters in the morning).
2. **Reduce screen-time:** If you're really serious about optimising your sleep then you should ideally cut out all computer, smart-phone, tablet and television use at night in order to minimise blue light exposure. If that is unrealistic, apply "night-shift" filters to your devices to minimise blue light exposure. There are also great options for glasses that filter out blue light.
3. **Read a book before bed:** Reading is a very relaxing and therapeutic pre-sleep activity as it can distract your mind from focusing on the stresses in your own life. *How* you read is very important though. One study looked at the impact of 2-hours of reading on a tablet before bed, versus 2-hours of reading a paper book. The results were dramatically different: reading with a tablet instead of a paper book resulted in a 50% reduction in melatonin release, as well as a 3-hour delay in melatonin release and peak. It also took tablet users longer to fall asleep, they had reduced REM sleep, were more tired the next day, and they had an ongoing lag in rising melatonin levels for several days after tablet use ceased (digital hangover).
4. **Temperature:** The optimal room temperature for sleeping is 18 degrees celsius, so if you sleep with air-conditioning then set it to this. You need your core body temperature to cool by 1 degree to initiate sleep, so a helpful trick is to have a *hot*





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shower or bath just before bed. The body will create an internal cooling response due to the hot water, drawing blood to the surface of your skin which cools the core body temperature. Having a hot shower or bath before bed makes you fall asleep faster and can give you 10-15% more nREM sleep.

5. **Go to bed and wake up at the same time daily:** Research has shown that this is one of the most important aspects of high-quality sleep. If life permits (e.g. work, kids, commitments), try and match your sleep times to your chronotype (i.e. morning lark, night owl, in-between). If you are a night owl, perhaps you can negotiate with your employer about starting and finishing work later, or have a discussion with your spouse about your preference for doing school pick-up rather than drop-off. If you are travelling, taking melatonin supplements as the sun is setting in your new location can assist with jetlag and resetting your circadian rhythm.
6. **Stress management:** Your own mind can be one of your biggest barriers to sleep. Before bed, write down a to-do list for the following day so that you can clear your head for the night. You should then spend 5-10-minutes doing a mindfulness activity like following your breath or doing a relaxing body scan.
7. **Exercise:** There are many benefits to your sleep from regular exercise, such as an increase in deep nREM sleep, improved sleep quality and duration, and reduced time to fall asleep. Sleep also has a big influence on exercise capacity, with poor strength and fitness outcomes after poor night sleep. Sleep and exercise feed each other, with regular exercise leading to better sleep, but good quality sleep also increasing your likelihood of regular exercise due to having more energy. One important tip: don't exercise right before bed as your core temperature will be too high. You should finish training 2-3 hours before bed.
8. **Caffeine:** The half-life of caffeine is 6 hours, meaning half of the drug quantity is still in your system 6-hours after you ingest it (and can take up to 12-hours to completely remove). Given this, you should limit caffeine to before midday, if at all. Try switching to herbal tea or soda water with fresh lemon as an alternative.
9. **Alcohol:** As you now know, alcohol prevents you from entering REM sleep. You should always aim to go to sleep with a blood alcohol concentration (BAC) of zero. It takes approximately 1-hour for your liver to process one standard drink, so if you are having a drink at night, ensure you give your body enough time to clear it from your system before hitting the hay. An even better solution is to swap your wine or beer for a non-alcoholic alternative, at least on the majority of nights.



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10. **Diet:** Avoid going to bed too full or too hungry as this can impact sleep quality. A lower carbohydrate diet has been shown to result in better sleep, so reduce your carbohydrate and increase fiber intake at dinner. Getting up to urinate multiple times per night is a common cause of sleep disturbance, so reduce your liquid intake before bed. There are a number of natural herbal supplements that can assist in sleep quality, without the negative side-effects of sleeping pills.



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## WEEK 10

### FINAL NOTES

Congratulations on committing to the program and playing full out. There has been so much information covered over the past 10 weeks. You now have all the resources to:

- Functionally improve your tissue strength - making the injury site more robust
- Activate appropriate core and pelvic muscles to support your spine
- Understand the biomechanical driving forces which contribute to your pain and pathology
- Understand pain - knowing that pain does not equal tissue injury state
- Create a flow of exercises suited to your back
- Understand pain relapse and how to work your way back to a functional back

We have prepared some video resources of individual exercises, as well as flow sets which we think will help you to practice appropriate strategies and find your perfect path with optimal progressions so that you can continue to improve over the coming months.

Please remember that you need to listen to your body and work at a level that is appropriate for you at that time.

ADVANZ EXERCISE LIBRARY:

<https://www.ahsmp.com/ahsmp-exercise-library/>

Below is a list of our recommended exercises. Please feel free to look through all exercises for an overall GREAT functioning body

- Adductor holds
- Lower limb stretches
- Prone core series L1
- Prone core series L2
- Prone Kneeling series
- Runners lunges
- Side plank series
- Side lying glute series
- Standing balance series
- Standing glute series
- Step up series
- Supine core series
- Supine glute series



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<https://vimeo.com/428967553> (easy to moderate)

<https://vimeo.com/423045586/4d6befd5f8> (moderate)

<https://vimeo.com/419698057> (moderate to difficult)

<https://vimeo.com/416641700/90722b42f3> (moderate to difficult)

<https://vimeo.com/410956526/59ee63fb66> (moderate + meditation)