



TE OPE KĀTUA O AOTEAROA  
**DEFENCE FORCE**

**Joint Support  
Group (JSG)**



# PHYSICAL HEALTH & WELLBEING

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**NZDF Wellbeing Series**

**6<sup>th</sup> November 2024**

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# Sleep

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A photograph of a man lying in bed, looking awake and stressed. A clock is visible in the foreground, suggesting a long night or early morning. The image has a blue tint.

**Up to 60% of the  
worlds population  
sleep poorly  
or suffer from sleep  
deprivation**

# Sleep?

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- What we do know

Better sleep (Optimal sleep) = **Enhanced Physical Performance**

Better sleep (Optimal sleep) = **Enhanced Cognitive Function**

- **Improved Health & Wellbeing!**

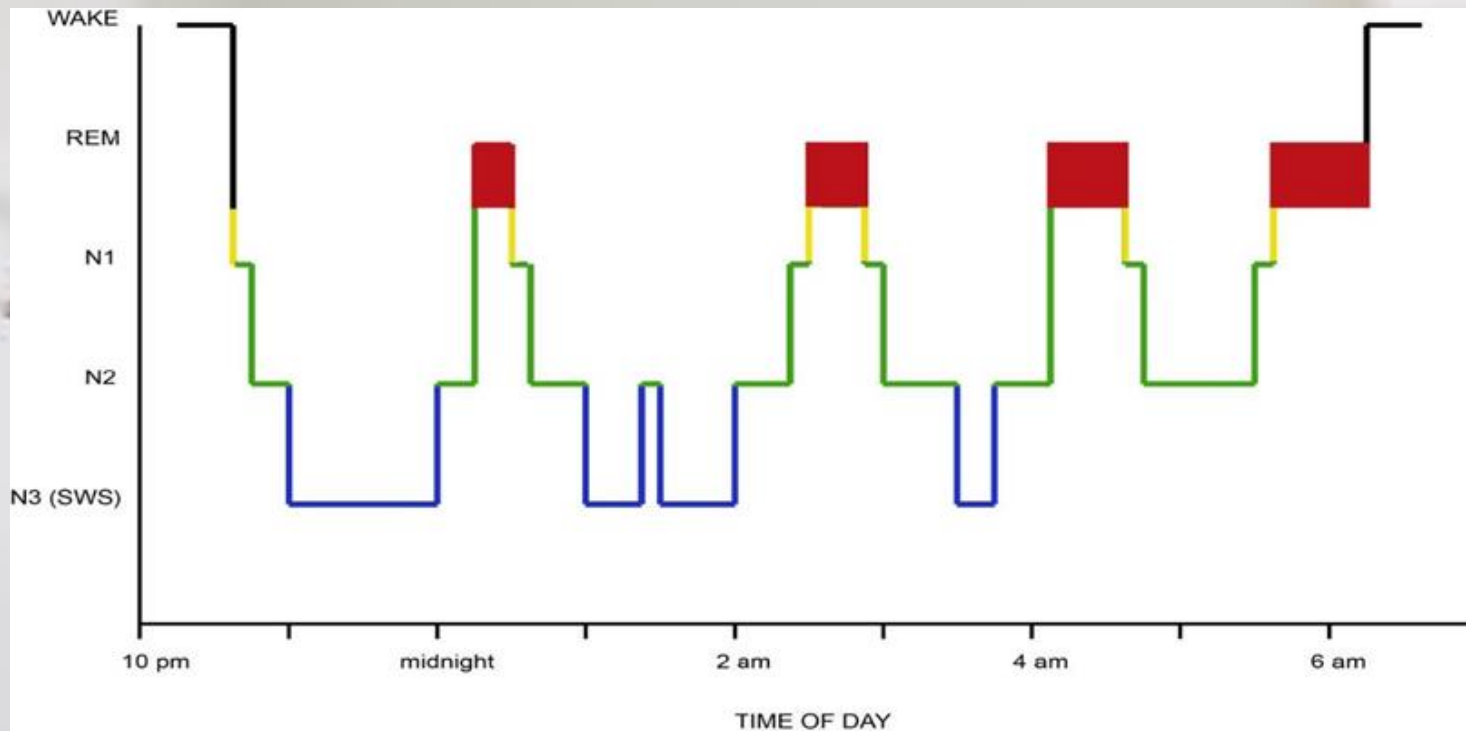




**Sleep is FREE!**

# What is Sleep?

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**The human sleep cycle (Carskadon & Dement, 2005). WAKE; indicated being awake, REM; represents rapid eye movement, N1; sleep stage one, N2 sleep stage two, N3 (SWS); represents sleep stage three, slow wave sleep.**

# 'Six Top Tips For Sleep'

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Stuff article (Sleep Research in the Military)



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# One: Sleep Hygiene

## SLEEP HYGIENE



PUT YOUR MOBILE AWAY AND  
SET AN ALARM CLOCK



YOU NEED ABSOLUTE DARKNESS  
AND QUIETNESS



READ A BOOK INSTEAD OF  
WATCHING A TV SHOW



ESTABLISH A PRE-BEDTIME  
RITUAL FOR YOURSELF



KEEP THE TEMPERATURE  
COMFORTABLY COOL



USE A HUMIDIFIER  
TO MOISTURIZE THE AIR

# Two: Reduce bright light

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- Lounge
- Kitchen
- Hallways
- Bedroom

• **Suppression of melatonin!**

• **ESSENTIAL SLEEP HORMONE!**



# Three: Get off Devices

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- Melatonin Suppression
- We need melatonin to be released 30-40min prior to sleep!



# Four: Reduce/ get rid of artificial light in the bedroom

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- Drapes
- Clocks
- Phones
- TVs
- Hair Drier



# Five: Keep the bedroom Cool

- Body temp at night



- Sleep better cool
- Fresh air
- Fans
- Natural airflow
- Layers on the bed



# Six: Reduce Caffeine from 12pm (Lunch)

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- Coffee
- Energy Drinks
- Neural stimulation
- Melatonin suppression
- Dehydration



# Optimal Sleep

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# SLEEP

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- Enhanced physical performance
- Enhanced cognitive performance
- Circadian rhythm
- Melatonin Release

## RESEARCH ARTICLE

# Sleep duration and physical performance during a 6-week military training course

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## Summary

Sleep is vital in influencing effective training adaptations in the military. This study aimed to assess the relationship between sleep and changes in physical performance over 6 weeks of military training. A total of 22 officer-trainees (age:  $24 \pm 5$  years) from the New Zealand Defence Force were used for this prospective cohort study. Participants wore wrist-actigraphs to monitor sleep, completed subjective wellbeing questionnaires weekly, and were tested for: 2.4-km run time-trial, maximum press-up and curl-ups before and after 6 weeks of training. Average sleep duration was calculated over 36 nights ( $6:10 \pm 0:28$  hr:min), and sleep duration at the mid-point ( $6:15$  hr:min) was used to stratify the trainees into two quantile groups (UNDERS:  $5:51 \pm 0:29$  hr:min,  $n = 11$ ) and (OVERS:  $6:27 \pm 0:09$  hr:min,  $n = 11$ ). There were no significant group  $\times$  time interactions for 2.4-km run, press-ups or curl-ups ( $p > .05$ ); however, *small* effects were observed in favour of OVERS for 2.4-km run (59.8 versus 44.9 s;  $d = 0.26$ ) and press-ups (4.7 versus 3.2 reps;  $d = 0.45$ ). Subjective wellbeing scores resulted in a significant group  $\times$  time interaction ( $p < .05$ ), with *large* effect sizes in favour of the OVERS group for Fatigue in Week 1 ( $d = 0.90$ ) and Week 3 ( $d = 0.87$ ), and Soreness in Week 3 ( $d = 1.09$ ) and Week 4 ( $d = 0.95$ ). Sleeping more than 6:15 hr:min per night over 6 weeks was associated with *small* benefits to aspects of physical performance, and *moderate to large* benefits on subjective wellbeing measures when compared with sleeping  $< 6:15$  hr:min.

## KEYWORDS

actigraphy, armed forces, exercise recovery, sleep restriction

# Operation early-bird: Investigating altered light exposure in military barracks on sleep and performance—a placebo-controlled study

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## Summary

The manipulation of light exposure in the evening has been shown to modulate sleep, and may be beneficial in a military setting where sleep is reported to be problematic. This study investigated the efficacy of low-temperature lighting on objective sleep measures and physical performance in military trainees. Sixty-four officer-trainees (52 male/12 female, mean  $\pm$  SD age:  $25 \pm 5$  years) wore wrist-actigraphs for 6 weeks during military training to quantify sleep metrics. Trainee 2.4-km run time and upper-body muscular-endurance were assessed before and after the training course. Participants were randomly assigned to either: low-temperature lighting (LOW,  $n = 19$ ), standard-temperature lighting with a placebo “sleep-enhancing” device (PLA,  $n = 17$ ), or standard-temperature lighting (CON,  $n = 28$ ) groups in their military barracks for the duration of the course. Repeated-measures ANOVAs were run to identify significant differences with post hoc analyses and effect size calculations performed where indicated. No significant interaction effect was observed for the sleep metrics; however, there was a significant effect of time for average sleep duration, and *small* benefits of LOW when compared with CON ( $d = 0.41$ – $0.44$ ). A significant interaction was observed for the 2.4-km run, with the improvement in LOW ( $\Delta 92.3$  s) associated with a *large* improvement when compared with CON ( $\Delta 35.9$  s;  $p = 0.003$ ;  $d = 0.95 \pm 0.60$ ), but not PLA ( $\Delta 68.6$  s). Similarly, curl-up improvement resulted in a *moderate* effect in favour of LOW ( $\Delta 14$  repetitions) compared with CON ( $\Delta 6$ ;  $p = 0.063$ ;  $d = 0.68 \pm 0.72$ ). Chronic exposure to low-temperature lighting was associated with benefits to aerobic fitness across a 6-week training period, with minimal effects on sleep measures.

# Nutrition Factors to Achieve Peak Performance

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Meeting dietary guidelines for Protein/Carbohydrates/Fats, 5+ a day of fruit and vegetables, good fibre intake, reducing saturated fat intake, reducing sugar intake, and food variety.

60%

Timing of when to eat food, eating before and after training, complementary nutrients.

30%

Supplements.

10%

# Protein

- Important nutrient to help build and grow muscle tissue.
- Important to have protein after exercise to maximise muscle building.
- Recommended daily intake:  
Low activity = 1 – 1.6g/kg/d,  
High Activity = 1.6 – 2.2g/kg/d  
80kg person = 80 – 128g/d or  
128 – 176g/d



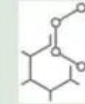
Protein is needed to grow, repair and maintain all cells and organs.



Protein transports other molecules through the blood + in/out of cells.


















Helps keep fluids balanced and where they need to be.



Some proteins are hormones aka messenger molecules.

## PROTEIN SOURCES CHART

(nutrition facts per 100g of each item)

<p>CHICKEN BREAST</p>  <p>29g protein</p>	<p>EGG</p>  <p>19g protein (3 eggs)</p>	<p>COTTAGE CHEESE</p>  <p>12g protein</p>	<p>PORK CHOP</p>  <p>25g protein</p>	<p>GREEK YOGURT</p>  <p>25g protein 1 cup</p>
<p>LEAN BEEF</p>  <p>29g protein</p>	<p>SALMON</p>  <p>14g protein</p>	<p>CHICKEN DRUMSTICK</p>  <p>24g protein</p>	<p>CHICKEN THIGH</p>  <p>23g protein</p>	<p>AHI TUNA</p>  <p>29g protein</p>
<p>BLACK BEANS</p>  <p>9g protein</p>	<p>LENTILS</p>  <p>9g protein</p>	<p>CHICKPEAS</p>  <p>9g protein</p>	<p>PEAS</p>  <p>5g protein</p>	<p>PUMPKIN SEEDS</p>  <p>18g protein</p>

# Carbohydrates

- The body's primary fuel source during intense exercise.
- Simple carbs are good for short bursts of energy (usually during exercise). More Digestible.
- Complex Carbs are good for sustained energy throughout the day.

## Whole Grain (Brown Rice) & Refined Grain (White Rice)











Structure & Structure

**endosperm**  
source of energy (carbs) and protein











**bran**  
fiber-filled layer full of nutrients (Vitamin B, minerals)

**germ**  
nutrient-rich core packed with vitamins, protein, minerals, amino acids, and fatty acids

### SIMPLE CARBS

-  White bread
-  White pasta
-  White rice
-  Cakes
-  Cookies
-  Candy
-  Ice cream
-  Non-diet sodas
-  Sugary cereals
-  Sweetened drinks

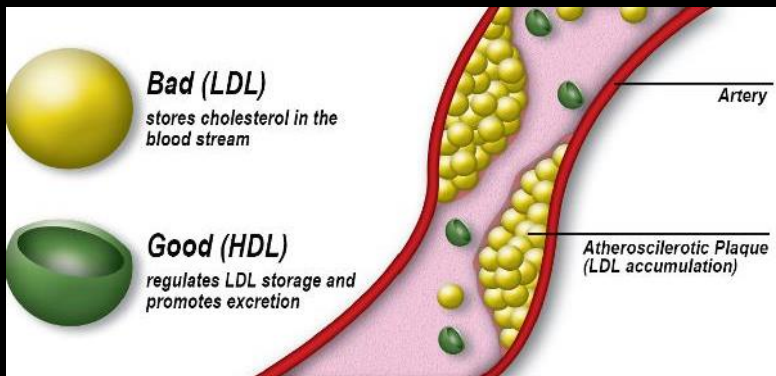
### COMPLEX CARBS

-  Whole wheat bread
-  Brown rice
-  Starchy vegetables
-  Fruit
-  Beans
-  Lentils
-  Quinoa
-  Oats
-  Sweet potatoes
-  Chia seeds

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# Fat

- Many important vitamins for health, important for hormones in the body.
- Polyunsaturated (PUFA), Monounsaturated (MUFA) are the best fats for health.
- Saturated fats are solid at room temperature (butter, meat fat, coconut oil). Linked with an increased risk of CVD.



# FATS

## THE GOOD THE BAD & THE UGLY



### GOOD

#### Monounsaturated & Polyunsaturated Fats

- Can lower bad cholesterol levels
- Can lower risk of heart disease & stroke
- Can provide essential fats that your body needs but can't produce itself

#### SOURCE

Plant-based liquid oils, nuts, seeds and fatty fish

#### EXAMPLES



### BAD

#### Saturated Fats

- Can raise bad cholesterol levels
- Can lower good cholesterol levels
- Can increase risk of heart disease & stroke

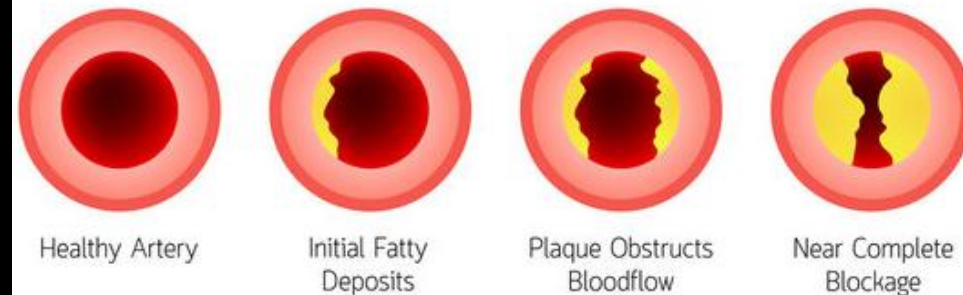
#### SOURCE

Most saturated fats come from animal sources, including meat and dairy, and from tropical oils

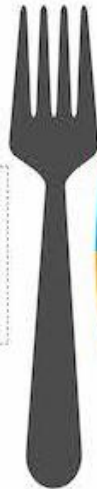
#### EXAMPLES



## CORONARY ARTERY DISEASE



# Power Plate Model

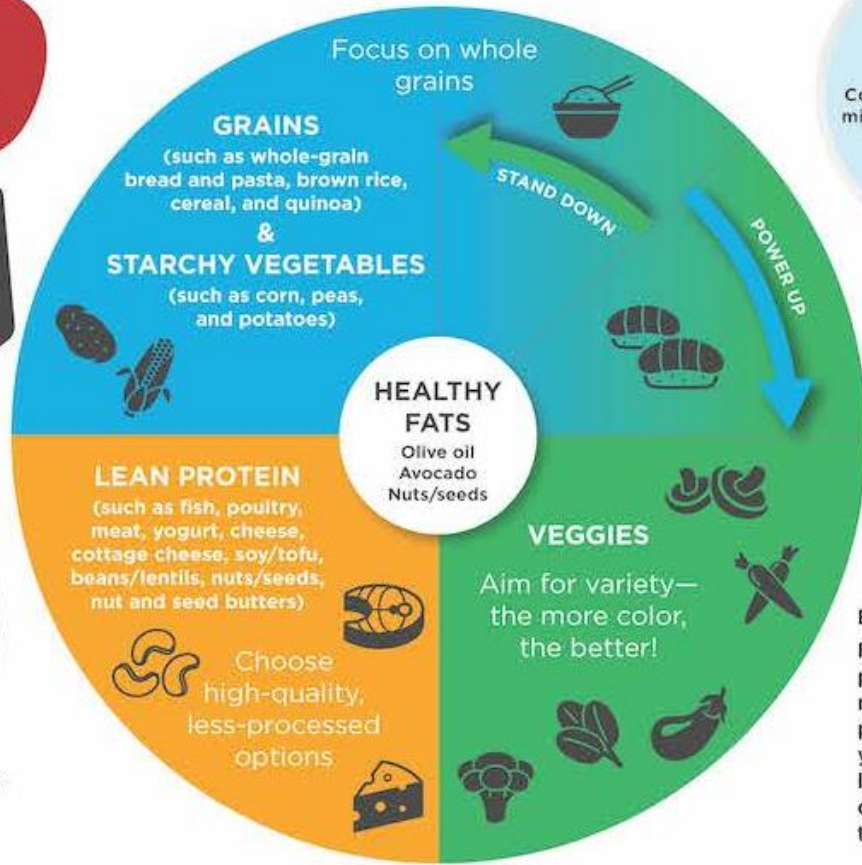


**EAT MINDFULLY**

- Slow down
- Take smaller bites
- Chew more
- Focus on flavor

## POWER PLATE

EAT TO FUEL YOUR PERFORMANCE



**WATER OR UNSWEETENED DRINKS**

Coffee\*, tea\*, milk/nondairy milk, 100% juice (limit 4 oz); sports drinks as needed

\*watch caffeine content

**POWER UP**  
Increase grains & starchy vegetables to 1/2 of your plate for intense training or operations

**STAND DOWN**  
Decrease grains & starchy vegetables to 1/4 of your plate on easy/rest days or for weight loss

**BE ACTIVE!**

For optimal performance, match your portions with your activity level (this can change day to day)



Adapted from:  
Team USA's *Athlete's Plates*


For more information, visit  
[HPRC-online.org/nutrition](http://HPRC-online.org/nutrition)

# Iron



- Daily Intake:  
Male – 9mg/d  
Females – 18mg/d  
Pregnancy – 27mg/d

**Signs of low iron**




- Low levels of energy/ Tiredness
- Dizziness
- Weakness
- Reduced endurance ability
- Racing heart beat
- Trouble focusing












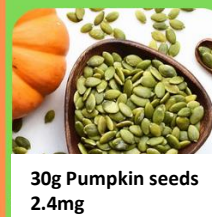


**INHIBITS IRON ABSORPTION:**  
*Avoid at the same meal as iron-rich foods*

-  **Calcium** - found in dairy foods (milk, yoghurt, cheese) can decrease absorption by 50 - 60%
-  **Tannins** - in tea and coffee can reduce absorption by 60 - 70%

**HELPS IRON ABSORPTION:**  
*Include at the same meal as iron-rich foods*

-  **Vitamin C** - (50+ mg) in the same meal as iron rich plant foods can increase absorption by up to 400% and help reverse the effects of iron inhibitors
-  **Carotenoids** - orange veggies and fruit, e.g. pumpkin, carrots, grapefruit and apricots
-  **Fermented foods** - reduce the presence of phytates e.g. kimchi, sauerkraut and miso

- Iron is essential in:  
Oxygen transport,  
Immunity, Growth  
& repair.

Non-Vegetarian Iron Sources			Vegetarian & Vegan Iron Sources		
 173g Steak: 5.8mg	 107g Chicken: 2mg	 1/2 cup Mussels: 7.5mg	 100g Tofu: 2.3mg	 100g Chickpeas: 1.4mg	 100g Lentils: 2.4mg
 100g Venison: 4.1mg	 75g Pork Chop: 1.2mg	 95g Tuna can: 1.4mg	 30g Pumpkin seeds: 2.4mg	 2 Boiled eggs: 1.5mg	 2 cups Spinach: 1.1mg

# Nutritional Effects on Stress

## Increases effects of Stress:

- Alcohol



- Excess Caffeine



- Sweeteners & Sugar



- Saturated Fat



## Decreases effects of Stress:

- Fruit & Veg



- Dietary Fibre



- Magnesium



- Omega 3 - Fatty Acids

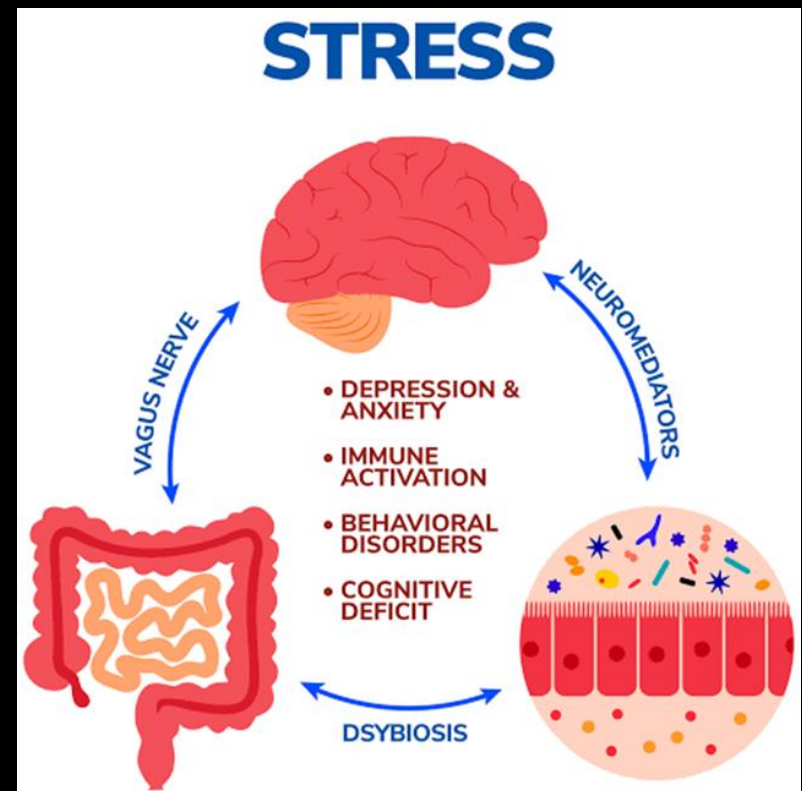


- Probiotics



# Gut – Brain - Axis

- The Enteric Nervous System (Gut), and Central Nervous System (Brain) are linked via a bidirectional pathway (Vagus Nerve).
- Anxiety, stress, depression – have all been linked with gut health.
- Improving gut health:
  - Probiotics
  - Fibre (prebiotics)
  - Exercise
  - Omega-3 (anti-inflammatory)



PROBIOTICS	FIBER-RICH FOOD	OMEGA-3 FATTY ACIDS
 Yogurt	 Avocados	 Salmon
 Sauerkraut	 Carrots	 Mackerel
 Kimchi	 Celery	 Flaxseed
 Kombucha	 Chia seeds	 Walnut



**HEI MANA MŌ AOTEAROA**  
**A FORCE FOR NEW ZEALAND**