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Case Study Report Assignment August 18
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Presenting: Chronic lower back pain and neck pain Concominant: Fairly constant fatigue, lethargy, decreased motivation (concentration, memory, mental alertness), tunnel vision HX: Bottle fed, asthma, accidents, acne, bulgind disk, viral gastroenteritis FX: Asthma, arthritis, CVD Medication: Panamax 5x/wk, Fish Oil 1000mg/day, Centrum 1-2tablets/day, Inner Health Plus 1 every 2 days, B12/Folate 1 tablet/day, Vitamin C –daily, Lysine (as needed) Nail: Wide, thin, vertical ridges, flat Skin: Acne, skin lesions on legs Tongue: Wide, scalloped, red tip, pale coat Eye: Blue irish with tight white fibres, some lymphatic rosary, scurf rim, grey stomach zone, broken ANW Elicited symptoms: Fall asleep easily, wakes to urinate, restless after, bad dreams, worries about future due to chronic illness, irritable and aggressive with pain, "strange" aching sensations down back of legs over past year, energy 3/10, better on rising, worse after lunch and 1 hour after work. Irregular hunger si
gnal. Infrequent indigestion, esp. after curry. Dysphasia resulting in painful esophageal spasm. Occasional bloating after over eating. Hungry at 10am. Bowels 1-2/day-loose, Undigested food. Urinate x6/day, fatigue after exercise, general fatigue when sitting, acne when shaving, cold sores, sores on limbs and back, slow to heal, SOB started 1 month ago following sinus and chest infection. Gained 3kg since stopping cycling last wk. Male, 35, 166cm, 87kg, Physiotherapy assistant, BP 121/82

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Executive Summary

The patient is presenting with chronic lower back and neck pain. Concomitantly he suffers from constant fatigue, general lethargy and decreased motivation characterized with signs of poor concentration, memory and mental alertness. He is obese with a BMI of 31.6. He is taking Panamax painkillers weekly to reduce the pain that is irritating him. He also experience acne and cold sores when stressed. Sores on limbs and back take a while to heal. He is ill with fatigue when sitting in the evening and immediately after exercise. He cycles 25 km daily and his lower limbs are weak. After a sinus and chest infection month ago, he developed SOB. He have also gained 3kg since he stopped cycling week ago. On further examination of blood tests, amoni acid profiles, allergy testing and diet analysis it shows many nutritional deficiencies pertinent in the maintenance of energy, functioning immunity, mental processors and general wellbeing. If this patient continues his poor diet there would be no improvement to his condition. Through implementation of the diet outlined on the page 17, the patient will see improvement in energy, weight, sleep and immune function. The nutrients listed from page 11-15 are also significant and the list beneficial foods was created to guide client into eating right foods. An improvement in his simultaneous symptoms of dysphagia, indigestion, bad dreams, worries and aggression will also benefit from this treatment.

Introduction

The patient is a 35 yr old male physiotherapy assistant. He has presented with chronic lower back pain with coexistent fatigue, dysphasia, acne, cold sores, SOB (which started 1 month ago after sinus and chest infection), lethargy, decreased motivation and tunnel vision. He suffered from a bulging disk in lumbar vertebrae in 1992. The patients energy levels are low, 3/10 and worries about the future, due to chronic illness. He has bad dreams and wakes to urinate around 3.30am. Currently he is medicated with Panamax and and variety of nutritional supplements listed on page 10.

Low back pain is a common symptom (Kumar and Clark 2005), and it is often work related. Causes of the pain in the lumbar region may be mechanical, inflammatory, metabolic or neoplastic. Orthodox treatment varies from analgesics and muscle relaxants to physical manipulation. It has been said that psychological and social factors may influence the time of presentation (Kumar and Clark 2005). Scoliosis may be present and mechanical lower back pain present s as visible muscle spasm the pain is palpable. Mechanical pain lessens when sitting or lying, thus further questioning about the pain is needed. According to Kumar and Clark, the source of pain may be a disk, posterior facet joints, spinal ligaments or muscles. Back pain is difficult to diagnose, however is often related to radiological spondylosis. Lower back pain may also be caused by poor posture and unsupportive chairs. Acute lumbar disc prolapse is usually unilateral; thus not relevant since this patient presents with ac hing in back of both legs. Lumbar nerve root entrapment in L5/S1 may present at posterior calf (Kumar and Clark 2005). Progressive loss off disc height and osteoarthritis contribute to root canal stenosis and causes buttock and bilateral leg pain. In addition, facet joint pain present as buttock and posterior thigh pain.

Way people perceive stress is also influence pain sensations. Negative expectations may result in the amplification of the pain. There is now behavioral evidence that brain is capable of exerting powerful clinically significant influences on the descending facilitatory pathways (Meeus et al. 2007). It is believed that cognitions, emotions, attention and motivation have influence on the clinical pain experience. Stress can also create gastro intestinal symptoms and is commonly associated with Irritable Bowel Syndrome (IBS). The brain and gut connection share many nerve endings and chemical transmitters (Osiecki 2008).

This client is suffering from variety of gut symptoms as well as fatigue. He does a lot of exercise; however has lately felt exhausted after. This patient may need referral to the doctor for further testing, since he feels fatigue when sitting. This may be assign of heart condition or asthma.

Diagnosis

Nutritional Deficiencies

It is important to fix the diet first and then combine with possible supplementation. The aims of this treatment are to treat inflammatory pathway to release any tight muscles that may cause lower back and neck pain. This patient may not be absorbing the nutrients he is taking, due to low Hydrochloric acid (HCL) levels in the stomach and insufficient pancreatic enzyme function, thus enzyme supplementation may be needed.

Nutrient Deficiency Associated with

Magnesium Anxiety, arterioscelerosis (FX of CVD), behavioral disturbances, chronic fatigue, confusion, enhanced free radical damage, irritability. Used to treat insulin resistance.

Iron Low immunity: Maintain normal immune function, manufacture antibodies and interleukins, avoid low HCL (Osiecki 2007).

B12 Deficiency of B12 and iron may result if HCL levels in a stomach are low. Deficiency may cause fatigue, memory loss, negativism and irritability(Osiecki 2007). Factors increasing demand are bacterial overgrowth in the gut, diabetes, gastric mucosal atrophy and pancreatic insuffieciency.

Pyridoxine Hardening of the arteries may be caused by high homocysteine levels. Pyridoxine is needed to convert homocysteine to cysteine (FX of CVD).

Zinc Zinc is used to treat achlorhydria, viral infections, poor appetite, pancreatic enzyme insuffieciency and stress. Deficiency may cause acne, low testosterone, low white blood cells, impaired wound healing, moodiness and sleep problems.

Calcium Back pain, agitation, cognitive impairment, irritability, osteomalacia, sciatica, spinal curvature.

Vitamin A Need A to release Fe to ferritin. Deficiency may cause or be associated with acne. It is also associated with vision, gene transcription, immune function, embryonic development and reproduction, bone metabolism, haematopoiesis, skin health and antioxidant activity (Combs, G. F. 2008).

Nail, skin, eye, tongue, weist hip ratio, irregular hunger signal, bad dreams, bloating after meals and low energy after lunch

Nail Vertical ridges=silica, protein malabsorption (Armstrong 2000).

Skin Acne: Zinc and vitamin A deficiency, EFA deficiency; lesions in legs. Cold sores=low immunity, stress

Eye Grey stomach zone indicates low HCL in the stomach. Lympahatic rosary=long standing lymphatic stasis, metabolic waste accumulation. Scurf Rim=toxins in the body coming out of skin (silica), under activity, encourage sweating (Armstrong 2000). Broken ANW may indicate leaky gut syndrome.

Tongue Scalloped tongue indicates digestive problems and liver stagnation. Red tip=Niacin deficiency (Osiecki 2008). Also it may indicate heart problems. Pale coat can indicate low HCL, lack of hunger signal, food may sit heavily, needs enzymes, digestive under activity (Armstrong 2000).

Waist hip ration Waist hip ration over 80 = CVD risk

Irregular hunger signal Zinc deficiency

Bad dreams Not digesting food properly, Irritable bowel syndrome

Bloating after meals Dysbiosis and small intestinal bacterial overgrowth (Pizzorno et al. 2008).

Low energy after lunch Blood sugar imbalance due to high GI foods. Can be balanced via low GI high protein diet. He may have insulin resistance. Hypoglycaemia.

FX=family history, CVD=cardiovascular disease, GI=glycemic index

Blood test

The patient has high Anion Gap that indicates metabolic acidosis and diarrhea (RCPA 2009), however it is still in recommended range and may not need attention just yet. Weakly acne when shaving indicates low immune system. His lymphocyte count is fairly low 1.7 compared to reference range 1.1-4.0, thus this may indicate drug abuse, lymphomas, HIV, low T-cells and B-cells or leukemia (RCPA 2009). The patient's total cholesterol is low 3.5 (3.6-7.3). Levels are reduced for up to 8 weeks with acute illness (eg, myocardial infarction, acute infection) and assessment should not be attempted during this time (RCPA 2009). Considering he has family history of cardiovascular disease and general fatigue even when sitting, may indicate he has heart issues. This clients S-Ferritin is high. Increased levels occur in acute phase response (RCPA 2009), such as inflammation (see table page 7). This client is in great amount of pain and he is getting irritable and aggressive in dealing with it. Pain indicates inflammation. Iron is also required for oxygen transport and release. This may reason the shortness of breath he is experiencing. Iron overload can cause free radical damage and high acidic

environment. This patient needs alkalizing foods such as green leafy vegetables. High ferritin may also be a sign of haemacromatosis, thought very rare. High iron in blood can mean low iron the body. Low iron can cause constant infections as iron is required to make antibodies and interleukins needed for functioning immunity. The deficiency can be caused by low levels of hydrocholoric acid (HCL)in the stomach, thus causing poor absorption (Haas 2006). B12 deficiency can result if low HCL is present (Gropper et al 2005). B12 is used to generate folate, thus both are usually depleted. His heamoglobin is in a low range as well (147 out of 135-180), indicating anemia or erythrocytosis. Large red blood cells may indicate B12 deficiency in the long term. Low globulin ma
y also indicate chronic inflammation and infection (26 out of 20-40). His testosterone levels must be tested since low testosterone can cause more inflammation (Tang YJ et al. 2007), therefore causing pain. In addition, the genomics and metabolemics must be assessed to confirm that there are no functional issues to process food (eg. Phenylketonuria).

Interpretation of the results of iron studies

RCPA (2009)

Nutrient Markers

Stress, worries, sleeping difficulties and nocturnal urination

The research indicates that chronic stressors are suppressing cellular and humoral immunity (Segerstrom and Miller 2004). His GGT levels are down to lower end (19 put of 0-70) and may be a sign of prostatitis, pancreatis, liver disease or diabetes (RCPA 2009). Prostatitis may imitate urinary tract infection and cause nocturnal urination (Oxford 2007) that this client is experiencing.

Stress induced depression can cause adrenal dysfunction (Piccorno et al. 2008). This will present as fatigue. Stress can also be inflammatory, via induction of pro-inflammatory cytokines and CPR production (Calcogni et al. 2006). During the chronic stress cortisol binds to CNS receptors and results in continued secretion of cortisol (Tosevski and Milovancevic 2006). This client suffers from acne and cold sores during the stress periods.

A low amount of nutrient marker Homovanillate may indicate depression, sleep disturbance, anxiety and fatigue (Metametrix 2009). Support with protein and ensure digestion of protein is working. Address stress. A high 8-hydroxy-2-deoxyguanosine indicates the rate of damage to DNA induced by oxidative stress (Metametrix 2009). It rises naturally with age, high cholesterol and hypertension. Support with antioxidants, vitamin C, E, flavonoids, glutathione and cysteine.

His Formiminoglutamate indicates that he is not folate deficient; however, vitamin C protects folate and may be beneficial (Metametrix 2009) to protect from future deficiencies. 2-Methylhippurate can show solvent oxidized via P450 enzymes. Fuel fumes, dry cleaners, new cars, carpets and industrial solvents may result in oxidative stress, thus glycine supplement will aid with liver phase-2 detoxification. In addition, glycine may help to prevent bacterial deamination of amino acid phenylalanine to produce benzoate. If it is conjugated with glycine, it will produce hippurate. Also ensure B5 and probiotics intake. Pickles and lunch meats should be avoided as well as sugars limited. Intestinal bacterial action on phenylalanine causes the appearance of phenylacetate and phenylpropionate in urine.

Anger that this client is experiencing indicates "Type-A personality" that is also related to elevated chronic pain intensity. Those who learn to control anger reduce risk of heart disease (Pizzorno 2008). In addition, helplessness, the belief that nothing can be done to resolve the problem can influence pain sensations negatively. This patient needs to learn how to cope and manage his stress. The practitioner can encourage him to achieve specific goals and give him credit in the follow up consultations. Positive support will facilitate pain management (Marchand 2008).

Malabsorption and afternoon slump, irregular hunger signal

Accordin to Metametrix (2009), the clients B-Hydroxybutyrate is low. This may indicate that he cannot mobilize or metabolize glucose. This may indicate metabolic acidosis and diabetes. This Low B-Hydroxybutyrate can also result in fatigue after exercise. Balance blood sugar levels and implement chromium. In addition, low Ethylmalonate may point to hypoglycaemia, nausea, fatigue and weakness as well. Carnitine helps to derive energy from fat and needs riboflavin as a cofactor (Metametrix 2009). Pancreatic enzyme supplementation may be needed. Gastric buffer is alkalizing, thus may help the acid pain pattern (Osiecki 2008). Gastric buffer, such as lemon juice before meals, also help to utilize nutrients.

Gastrointestinal function, flora and mucosa

People with gluten sensitivity doesn't necessarily present with gastrointestinal (GIT) symptoms, but myopathy. Thus he must be tested for IgG levels. Gluten sensitizes the gut since the proteolytic fragments of wheat gluten induce maturation of dendritic cells and the secretion of some cytokines and chemokines (Nikulina 2004). Bloating and diarrhea indicate gut bacterial dysfunction and increased permeability; therefore susceptibility to inflammation is increased. The food allergies may cause mucosal permeability. He may benefit from Saccharomyces boulardii that is non-colonising probiotics yeast supplement recommended by Metametrix if the client's 3,4-Dihydroxyphenylprophionate is low, as it is in this case. Other beneficial nutrients are garlic, citrus seed extract and aloe vera juice.

Other causes for IBD-stress response may be paracites, microbial invation or physical trauma. Risk

factors include high saturated fat and refined, processed food. Malabsorption can present as loose stool and anemia. Depletion of nutrients is evident if body is not able to absorb food. Two thirds of patients with IBS have food intolerances (Pizzorno et al. 2008) thus he should be tested. This patient has loose stools that point to too fast transit time that causes irritation of the bowel. Stress aggravates IBS. Considering that the patients has a family history of arthritis it is pertinent to consider treating dysbiosis in the small intestine. Degree of dysbiosis is linked to severity of the arthritic symptoms (Pizzorno et al. 2008). Since he has genetic risk factors as well as possible abnormal bowel permeability, it is important to prevent the development of arthritis. Panamax aggravates GI-tract thus should be avoided.
Achlorhydria may cause indigestion and bacterial overgrowth in intestine. Achlorhydria is also associated with H.Pylory infections and low pepsin in the stomach. This can cause impaired ingestion of protein (Osiecki 2008). Consequently, the amino acids are poorly available, hence depression may occur. H-pylori may also indicate cardiovascular problems; and cause a chronic infection and inflammation. Chronic inflammation can lead to severe unrelated diseases and plays a role in the development of hypertension, atherosclerosis, depression, irritable bowel syndrome, functional digestive disorders and cancer (Edwards 2005). This patients white cell count is fairly low (5.7 out of 4.0-11.0). This may point toward infection, inflammation or malignancy (RCPA 2009). Iron is needed to secrete Hydrochloric acid (HCL) in the stomach. HCL ensures the absorption of nutrients and breaks down food. As mentioned before, HCL production can also be supported by ingesting warm lemon water
fifteen minutes before meals. Alternatively, one may take apple cider vinegar.
Gropper (2005) indicates that a lack of pyridoxine inhibits formation of cysteine from homocysteine. Therefore, overload of homocysteine may cause heart disease and hardening of the arteries (Kumar and Clark 2005). However, this patient has low total cholesterol. As mentioned before, low total cholesterol may mean acute infection or myocardial infarction.
Musculoskeletal/Family history of arthiritis
Pain down the leg is not always sciatic. Sacro-iliac pain is more to the side, but still radiate sto the back (Prolotherapy for Doctors 2009). In addition, certain foods such as citrus fruits, artificial sweeteners and spices can aggravate pain, thus should be avoided (Shorter et al. 2007). Avoid all identified food sensitivities.

Nutritional requirements

Currently taking: Recommended Dosages:
Panamax (as needed)
Fish Oil 1000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet every two days
B12/Folate 1 tablet daily
Vitamin C/daily
Lysine (as needed) Panamax (May cause gut symptoms and affecdt B12 intake (Osiecki 2007). Try magnesium supplemention for pain).
Fish Oil 3000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet twice a day
B12 300-8000 ug/day (Achlorhydria,acne, bowel incontinence, CVD, pancreatic insufficiency, cold sores, cognitive impairment)
Folate 1-5mg/day (acne, atheroscelerosis, diabetes, fatique, stress, zinc deficiency)
Vitamin C/2000 mg daily
Lysine 3000mg/day when cold sores are present

Nutrients and phytochemicals needed Rationale/functions facilitated Food source of the nutrient/ phytochemical
Lipoic acid Tissue ischaemia, mitochondrial dysfunction, nerve support Broccoli, kidney, liver, potatoes, spinach, tomatoes
Carnitine Tissue ischaemia, mitochondrial dysfunction Avocado, beef, chicken, fish, milk, liver
Green leafy vegetables Tissue acidity, alkalising Green leafy vegetables
GABA/glutamate Brain: endogenous pain modulation, neural inflammation, sleep improvement, Skeletal muscle Glutamine: Beans, cottage cheese, dairy, legumes, sausage meat, most protein sources, ricotta, rolled oats
Phenyl alanine/tyrosine Brain: endogenous pain modulation (dopamine, noradrenaline, adrenaline), adrenal insufficiency, mild-moderate depression, neural inflammation, stress relief, physical and mental fatique associated with stress, short term memory, perceptual motor skill n(Deijen et al. 1999) Phe:

Almonds, avocado, banana, brown rice, cottage cheese, eggs, fish, herrings, lentils, meat, nuts
Tyr: Almonds, avocado, banana, beans, pumpkin seeds
5-HTP Brain: endogenous pain modulation, neural inflammation, stress relief, immediate precursor to serotonin, reduces overall sensation of pain, suppresses appetite and promotes restful sleep. Derived from amino acid tryptophan. Tryptophan rich foods:
Bananas, beef, beans, dairy, cottage cheese, fish, legumes, lentils, oats, pumpkin seeds, sesame seeds

EPA/DHA Anti-inflammatory, reduce risk of heart disease, lower LDL and triglycerides, inhibit platelet aggregation, lower fibrinogen levels, lower systolic and diastolic blood pressure. Lowers rate of myocardial infarction (MI) (Pizzorno 2008). Fish oil
Calcium Arthiritis, backache, bone pain, cramps Almonds, broccoli, buckwheat, egg yolk, green leafy vegetables, molasses, sardines, turnips
Magnesium Muscle relaxant, neurotransmitter support, calm the mind, essential to cardiovascular functioning, prevent heart disease and stroke, dilates coronary arteries, reduces peripheral vascular resistance (Pizzorno 2008). Decreases analgesic requirements (Lysakowski et al. 2007). Acholorhydria, athletes, chronic fatigue, soft tissue calcification (Osiecki 2007). Almonds, cashew′s, cocoa, cod, lima beans, figs, mineral water, molasses, parsnips, kelp, eggs, seeds.
Malic acid Physical exhaustion, muscular pain, improves mitochondrial respiration, intermediate in Kreb′s cycle, endurance for athlete training Apples, currants, most tart fruits
Curcuma Anti-inflammatory, inhibits TNF-alpha, antioxidant activity, potent inhibitor of nuclear factor kappa-B, may be useful as a powerful anti-depressant agent (Xu et al. 2005) Turmeric
Allicin Anti-inflammatory, inhibit platelet aggregation, increases microcirculation of the skin, decreases plasma viscosity Garlic
Gingerol Anti-inflammatory, inhibits pro-inflammatory cytokines: IL-12, TNF-alpha, IL-1-beta, MCP-1, and RANTES Ginger
Quercetin Anti-inflammatory Onion
Cloves Inhibit leukotrienes, arachodonic acid and stimulate PMNL cells Cloves
Anthocyanins Exhibit anti-inflammatory properties via inbiting COX activities and scavenging of the reactive nitric oxide radical (NO) Cherries
Polyphenols including phenolic acid, flavonoids, stibenes and lignans Specific anti-oxidants affect nuclear factor kappa-B, inducible NO expression, COX inhibition and defend against advanced glycation end products (AGEs) Fruit, vegetables, green tea and plant foods
Nuts and seeds Plasma levels of C-reactive protein, interleukin-6, and fibrinogen Nuts and seeds
Acid supplement, betaien HCL, pancreatic enzymes and bitters foods Improve gastric acid and bile production.
Bile helps to break down fat.
Gastric acid helps to breakdown food in a stomach. Stimulates absorption of nutrients and is the most important non-immunological defense system against microbes (Osiecki 2008). Bitter foods, such as rocket help to increase bile.
Lemonjuice or apple cider vinegar 15 minutes before meals
Supplement
Pro-biotic Supplement with immune enhancing pro-biotic. Improves bowel flora. Improves gut barrier functions.
Increase beneficial intestinal bacteria, prevent leaking of unwanted toxins from the bowel back to bloodstream.
Fibre Improves bowel flora, repairs gut wall, soluble fibre reduces cholesterol, promotes weight loss, enhance glycaemic control, decrease insulin levels, reduces calories absorbed (Pizzorno et al. 2008). Psyllium husks, whole meal products, unrefined flour, glucomannan, gum karaya, chitin, guar gum, pectin
Glutamine Precursor to GABA, promotes healing and bowel rescue (Osiecki 2007). Immune enhancer, improves IgA levels. Intestinal impermeability. Villi atrophy. Poor concentration. Wound healing. Cottage cheese, legumes, sausage meat, rolled oats, beans
Phytochemicals, carotenes, lycopene, lutein Protect against heart disease, slow down the aging process, antioxidant, less dense LDL particles (Pizzorno 2008) Red and orange vegetables, roma tomatoes
Resveratrol and flavonoids Protect gainst LDL oxidation Redwine, organic grapejuice
Vitamin C Partners with vitamin E and carotenes and regenerates COQ10. Reduces risk of death from MI and stroke. Lower triglycerides, strengthen arterial collagen, lower BP, higher HDL, promote fibrinolysis, reduce markers of inflammation, inhibiting platelet aggregation Supplement. Food: Black currants, aloe vera juice, broccoli, brussel sprouts, citrus fruit, guava, parsley, pawpaw, peppers, pineapple, potatoes, raw cabbage, rosehips, strawberries, sweet potatoes, tomatoes

Vitamin A Skin, maintain tight junction function between cells, thus help to neutralize the hydrogen

ion at the tissue level. Alkalising. Correction of acidosis Apricots, barley grass, butter, carrots, fish liver oils (cod, salmon, halibut), green leafy vegetables, kohlrabi (German turnip), liver, mint, egg yolk
B6, B12 and folate Increase the dose of B12 and folate. Preventing homocysteine from clogging the arteries. B6=avocado, banana, carrot
B12=egg yolk, herring, meat
Folate=beans, eggs, sprouts
B5 Adrenal stress, nervousness, polyneuritis, poor immunity, arthritis, skin disease Avocado, egg yolk, green vegetables, mushroom, oranges, peas
Taurine Anxiety, fat malabsorption, heart function, sperm motility Eggs, animal protein
Glycine Detox salicylates, possible arthritis, reduces residual volume in the bladder (Osiecki 2007), leg ulcers (he has sores in legs), inflammation, poor digestion, neurotoxic cell death, wound healing, spinal injuries, stroke Gelatine, most protein, beans, brewer's yeast, eggs, fish, seafood, lactalbumin, nuts, whey protein
Arginine In a presence of glycine arginine is wound healing Almond, beans, carob, cashews, garlic, peas, pecans, sea food
Chromium Body building, coronary artery disease, hyperglycaemia, elevated intake of glucose or refined carbohydrates Asparagus, apples, egg yolk, mushrooms, nuts, oysters, potato, prunes, unprocessed wheat (35-45% loss in refining flour).

Dietary Plan
In lean person, a meal stimulates up to a 40% increase in diet induced thermogenesis. Overweight person stimulates just 10% and in the obese energy is stored and not converted into heat at all (Pizzorno et al. 2008). The patient's current BMI (Basal Metabolic Index) is 31.6. To obtain a ideal BMI level of 23 the patient needs to weigh approximately 52-69kg.
BMI=Weight Kg/ (Height)2
Recommended BMI=23
23=X kg/2.7556m
Xkg=23x2.7556
Xkg=63.4kg is the recommended weight for this patient.
Protein requirement
Ideal weight x 0.9 x Exercise factor
63.4 x 0.9 x 1.2
68.9g of protein/day
According to Gropper (2005), the recommended protein requirement is 56 grams/day for a male aged 31-50. However, since he is obese he may require more protein. The amount of protein in foods varies and client need to be educated how much protein is in each meal. With his old diet the total protein intake was 20%. In contrast to the new diet has 32% protein. Protein uptake can be enhanced with a protein shake or a protein bar snack.
Carbohydrates and fiber
Excess carbohydrates are converted to fat and ideally total carbohydrates of the total diet should be 30%. He is lacking protein and essential fatty acids, thus the ration should be protein 40% and fat 30%. The ratio of the protein, fat and carbohydrates for the new diet is protein 32%, fat 37% and carbohydrates 31%. The old diet showed excess carbohydrates with 40% of carbohydrates, 40% of fat and only 20% protein like mentioned above. There was a significant drop in carbohydrate intake from 180.130 to 92.305. Fiber increased from 22.435 to 31.408. However, fiber to reach 100% intake, he needs to increase fiber for 17%. This may be done by adding a psyllium husks or slippery elm drink on a daily diet. These products were not included into Foodworks program, thus were not included into diet calculations. The old diet was high in GI and sodium. Improved new diet had 760.342 sodium, compared to the old one 2461.71.

Energy expenditure
Ratio energy from protein is 20%, whereas fat and carbohydrates are 40%. He does not drink alcohol, thus no energy is from alcohol. In the new diet the energy from protein ranges between 32-37% for the breakfast and dinner. Energy DF with new diet was 5299.063k/j; the old diet instead, had 7753.470k/j of Energy DF.
Fat Ratio
54% of the fat with the old diet was from saturated fats while with the new diet provided a lot lower saturated fat ratios in all meals was achieved; ranging from 17-37% (including breakfast, morning tea, lunch, afternoon tea and dinner). Saturated fat having medium-length chains, along with unsaturated trans fatty acids, are hypercholesterolemic, while mono and polysaturated cis fats tend to lower serum

cholesterol (Gropper 2005). New diet ratios for fat were: Poly 37%, mono 40% and saturated 23%. Old diet: poly 13%, mono 34% and saturated 54%. This signifies the improvement for healthy fat ratio in the innovative diet. Fat in total with the old diet was 40%, whereas with the new one it was 37%. The amount of fat can be 40%, as long as it comes in easily digestible sources and forms. Saturated fat in grams reduced from 41.01g to 9.968g with the new diet.
The following foods are essential in this clients diet:

- Onions, garlic, ginger and turmeric
- High fibre
- Nuts, seeds
- Slippery elm, Aloe vera juice
- Lean meat such as kangaroo
- Dark green leafy vegetables (bok choy, rocket, kale)
- Oily fish (mackerel, salmon)
- Brown rice
- Maintain hydration 2-3 litres/day
- Eat 5-6 small meals a day
- Always eat the protein portion of the meal first and have protein in each meal

Recommended diet
Meal Time Meal contents
Breakfast 7am Sardines, spinach, mushroom, tomato,onion, ryebread
Morning Tea 10.30 Boiled egg and apple
Lunch 1pm Borsch Soup: beetroot, red cabbage, carrot, onion, celery, water, garlic, black pepper, kangaroo meat
Afternoon tea 3pm Bornhoffen yogurt, berries, LSA mix, psyllium husks
Dinner 6pm Salmon cooked in olive oil and garlic, Kippfler potato mash with lime juice, served on the bed of rocket, lemonjuice, pinenuts, snowpeas, cucumber, red capsicum, white peppar, cherry tomatoes and fresh basil leaves.
Fluids Water (2.5l), 1 cup of green tea, 1 cup of rooibos tea
Total Daily Calorie Value (Foodworks 2009)

Dietary calculator (Shoring 2009) shows this patient needs total of 4120.20 Kcal per/day to maintain homeostasis. The new diet sustain 2454.407 Kcal reduction that be supposed to weight loss, thus help in the treatment of this client. His Total Energy Requirement indicated in Dietary Calculator (see appendix), is 2608.2. His Protein Intake requirement is 1.4 with his level of Exercise Factor (recommended range 1.1-1.5). This is 26.46 gm per meal (Dietary Calculator 2009) According to Dietary Calculator (2009) his fat intake per meal should be 31.20 gm. Recommended carbohydrate intake is 111.28/per meal. However, this amount of carbohydrates can be debatable in obese people.
Previous macronutrient percentages and breakdown of fat are shown in Food Record 2, pg. 6. At present the diet is high in saturated fat (54%) and refined, processed carbohydrates (40%) that are acidifying the body (see appendix Food Record 2 pg. 6). Seaman (2002) supposed that people literally eat themselves into inflamed state by consuming pro-inflammatory foods. He needs to reduce grains and increase fruit and vegetables (Frassetto 2006). Low nutritional value in combination with high saturated fat is contributing to the patient's condition. He needs to increase anti-inflammatory fat such as omega 6. He will benefit from high protein diet that will prevent muscle wasting and fatigue also. Uptake of amino acids by the skeletal muscles readily occurs following protein-containing meal (Gropper 2005).
White fat cells aggravate blood sugar imbalance and promote atheroscelerosis (Pizzorno et al. 2008). Brown fat instead helps to increase capacity to metabolize fats (Pizzorno et al. 2008). Obese person have less brown fat, thus energy is stored instead of turned into heat. Thermogenesis needs to be increased by enhancing insulin sensitivity. This can be done by controlling hyperglycemia with chromium based foods (see Nutritional Requirements, pg 15). Chromium is a component of Glucose Tolerance Factor (GTF) and aids glucose metabolism. Approximately 56% of the population is at risk of being Chromium deficient (Osiecki 2007). Chromium also may reduce total cholesterol, triglycerides and high density lipoprotein. Supplementation of chromium lower white fat in the body and increase lean body mass by increasing insulin sensitivity (Pizzorno et al. 2008).
Conclusion
This treatment protocol is designed to ease of the patient's pain, enhance immune system, reduce inflammation and simultaneously reduce the emotional symptoms. Nutritional deficiencies can deplete energy levels thus contributing to pain tolerance factors. Antioxidant mechanisms in the body act synergistically as the best line of defense against free radical attack (ARL 2009). The body possesses a number of mechanisms to control the production of reactive oxygen species and to limit or repair the damage to tissues. By changing the diet the regulation of neurotransmitters is also enhanced, thus normal sleep pattern is restored also. It would be beneficial for the patient to reduce

medication that may contribute to gastro intestinal symptoms. The implementation of the nutritious diet may help to reduce stress like symptoms and improve his overall health. Compliancy of the client is important and the results will be quicker if he is able to adapt to the changes. The client needs to be educated how to prepare food (excess oils, nutrient losses) and adulteration of the diet. Intake and also the portion sizes are important as well as how the food is absorbed individually. Energy usage must be calculated into ones diet. It is wise to consider organic food, since the level of phytochemicals and isoflavones varies according to how the food is grown. Dietary mod
ification and nutritional supplementation appear to be the only treatments that can tackle the underlying cause, which is diet-induced pro-inflammatory state.

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Appendices

1. Food works/Food record 2
2. Dietary calculator

Case Study Report Assignment August 18 2009
Presenting: Chronic lower back pain and neck pain Concominant: Fairly constant fatigue, lethargy, decreased motivation (concentration, memory, mental alertness), tunnel vision HX: Bottle fed, asthma, accidents, acne, bulgind disk, viral gastroenteritis FX: Asthma, arthritis, CVD Medication: Panamax 5x/wk, Fish Oil 1000mg/day, Centrum 1-2tablets/day, Inner Health Plus 1 every 2 days, B12/Folate 1 tablet/day, Vitamin C –daily, Lysine (as needed) Nail: Wide, thin, vertical ridges, flat Skin: Acne, skin lesions on legs Tongue: Wide, scalloped, red tip, pale coat Eye: Blue irish with tight white fibres, some lymphatic rosary, scurf rim, grey stomach zone, broken ANW Elicited symptoms: Fall asleep easily, wakes to urinate, restless after, bad dreams, worries about future due to chronic illness, irritable and aggressive with pain, "strange" aching sensations down back of legs over past year, energy 3/10, better on rising, worse after lunch and 1 hour after work. Irregular hunger si
gnal. Infrequent indigestion, esp. after curry. Dysphasia resulting in painful esophageal spasm. Occasional bloating after over eating. Hungry at 10am. Bowels 1-2/day-loose, Undigested food. Urinate x6/day, fatigue after exercise, general fatigue when sitting, acne when shaving, cold sores, sores on limbs and back, slow to heal, SOB started 1 month ago following sinus and chest infection. Gained 3kg since stopping cycling last wk. Male, 35, 166cm, 87kg, Physiotherapy assistant, BP 121/82

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Executive Summary

The patient is presenting with chronic lower back and neck pain. Concomitantly he suffers from constant fatigue, general lethargy and decreased motivation characterized with signs of poor concentration, memory and mental alertness. He is obese with a BMI of 31.6. He is taking Panamax painkillers weekly to reduce the pain that is irritating him. He also experience acne and cold sores when stressed. Sores on limbs and back take a while to heal. He is ill with fatigue when sitting in the evening and immediately after exercise. He cycles 25 km daily and his lower limbs are weak. After a sinus and chest infection month ago, he developed SOB. He have also gained 3kg since he stopped cycling week ago. On further examination of blood tests, amoni acid profiles, allergy testing and diet analysis it shows many nutritional deficiencies pertinent in the maintenance of energy, functioning immunity, mental processors and general wellbeing. If this patient continues his poor diet there would be no improvement to his condition. Through implementation of the diet outlined on the page 17, the patient will see improvement in energy, weight, sleep and immune function. The nutrients listed from page 11-15 are also significant and the list beneficial foods was created to guide client into eating right foods. An improvement in his simultaneous symptoms of dysphagia, indigestion, bad dreams, worries and aggression will also benefit from this treatment.

Introduction

The patient is a 35 yr old male physiotherapy assistant. He has presented with chronic lower back pain with coexistent fatigue, dysphasia, acne, cold sores, SOB (which started 1 month ago after sinus and chest infection), lethargy, decreased motivation and tunnel vision. He suffered from a bulging disk in lumbar vertebrae in 1992. The patients energy levels are low, 3/10 and worries about the future, due to chronic illness. He has bad dreams and wakes to urinate around 3.30am. Currently he is medicated with Panamax and and variety of nutritional supplements listed on page 10.

Low back pain is a common symptom (Kumar and Clark 2005), and it is often work related. Causes of the pain in the lumbar region may be mechanical, inflammatory, metabolic or neoplastic. Orthodox treatment varies from analgesics and muscle relaxants to physical manipulation. It has been said that psychological and social factors may influence the time of presentation (Kumar and Clark 2005). Scoliosis may be present and mechanical lower back pain present s as visible muscle spasm the pain is palpable. Mechanical pain lessens when sitting or lying, thus further questioning about the pain is needed. According to Kumar and Clark, the source of pain may be a disk, posterior facet joints, spinal ligaments or muscles. Back pain is difficult to diagnose, however is often related to radiological spondylosis. Lower back pain may also be caused by poor posture and unsupportive chairs. Acute lumbar disc prolapse is usually unilateral; thus not relevant since this patient presents with ac hing in back of both legs. Lumbar nerve root entrapment in L5/S1 may present at posterior calf (Kumar and Clark 2005). Progressive loss off disc height and osteoarthritis contribute to root canal stenosis and causes buttock and bilateral leg pain. In addition, facet joint pain present as buttock and posterior thigh pain.

Way people perceive stress is also influence pain sensations. Negative expectations may result in the amplification of the pain. There is now behavioral evidence that brain is capable of exerting powerful clinically significant influences on the descending facilitatory pathways (Meeus et al. 2007). It is believed that cognitions, emotions, attention and motivation have influence on the clinical pain experience. Stress can also create gastro intestinal symptoms and is commonly associated with Irritable Bowel Syndrome (IBS). The brain and gut connection share many nerve endings and chemical transmitters (Osiecki 2008). This client is suffering from variety of gut symptoms as well as fatigue. He does a lot of exercise; however has lately felt exhausted after. This patient may need referral to the doctor for further testing, since he feels fatigue when sitting. This may be assign of heart condition or asthma.

Diagnosis

Nutritional Deficiencies
It is important to fix the diet first and then combine with possible supplementation. The aims of this treatment are to treat inflammatory pathway to release any tight muscles that may cause lower back and neck pain. This patient may not be absorbing the nutrients he is taking, due to low Hydrochloric acid (HCL) levels in the stomach and insufficient pancreatic enzyme function, thus enzyme supplementation may be needed.
Nutrient Deficiency Associated with
Magnesium Anxiety, arterioscelerosis (FX of CVD), behavioral disturbances, chronic fatigue, confusion, enhanced free radical damage, irritability. Used to treat insulin resistance.
Iron Low immunity: Maintain normal immune function, manufacture antibodies and interleukins, avoid low HCL (Osiecki 2007).
B12 Deficiency of B12 and iron may result if HCL levels in a stomach are low. Deficiency may cause fatigue, memory loss, negativism and irritability(Osiecki 2007). Factors increasing demand are bacterial overgrowth in the gut, diabetes, gastric mucosal atrophy and pancreatic insuffieciency.
Pyridoxine Hardening of the arteries may be caused by high homocysteine levels. Pyridoxine is needed to convert homocysteine to cysteine (FX of CVD).
Zinc Zinc is used to treat achlorhydria, viral infections, poor appetite, pancreatic enzyme insuffieciency and stress. Deficiency may cause acne, low testosterone, low white blood cells, impaired wound healing, moodiness and sleep problems.
Calcium Back pain, agitation, cognitive impairment, irritability, osteomalacia, sciatica, spinal curvature.
Vitamin A Need A to release Fe to ferritin. Deficiency may cause or be associated with acne. It is also associated with vision, gene transcription, immune function, embryonic development and reproduction, bone metabolism, haematopoiesis, skin health and antioxidant activity (Combs, G. F. 2008).

Nail, skin, eye, tongue, weist hip ratio, irregular hunger signal, bad dreams, bloating after meals and low energy after lunch
Nail Vertical ridges=silica, protein malabsorption (Armstrong 2000).
Skin Acne: Zinc and vitamin A deficiency, EFA deficiency; lesions in legs. Cold sores=low immunity, stress
Eye Grey stomach zone indicates low HCL in the stomach. Lympahatic rosary=long standing lymphatic stasis, metabolic waste accumulation. Scurf Rim=toxins in the body coming out of skin (silica), under activity, encourage sweating (Armstrong 2000). Broken ANW may indicate leaky gut syndrome.
Tongue Scalloped tongue indicates digestive problems and liver stagnation. Red tip=Niacin deficiency (Osiecki 2008). Also it may indicate heart problems. Pale coat can indicate low HCL, lack of hunger signal, food may sit heavily, needs enzymes, digestive under activity (Armstrong 2000).
Waist hip ration Waist hip ration over 80 = CVD risk

Irregular hunger signal Zinc deficiency
Bad dreams Not digesting food properly, Irritable bowel syndrome
Bloating after meals Dysbiosis and small intestinal bacterial overgrowth (Pizzorno et al. 2008).
Low energy after lunch Blood sugar imbalance due to high GI foods. Can be balanced via low GI high protein diet. He may have insulin resistance. Hypoglycaemia.
FX=family history, CVD=cardiovascular disease, GI=glycemic index

Blood test
The patient has high Anion Gap that indicates metabolic acidosis and diarrhea (RCPA 2009), however it is still in recommended range and may not need attention just yet. Weakly acne when shaving indicates low immune system. His lymphocyte count is fairly low 1.7 compared to reference range 1.1-4.0, thus this may indicate drug abuse, lymphomas, HIV, low T-cells and B-cells or leukemia (RCPA 2009). The patient's total cholesterol is low 3.5 (3.6-7.3). Levels are reduced for up to 8 weeks with acute illness (eg, myocardial infarction, acute infection) and assessment should not be attempted during this time (RCPA 2009). Considering he has family history of cardiovascular disease and general fatigue even when sitting, may indicate he has heart issues. This clients S-Ferritin is high. Increased levels occur in acute phase response (RCPA 2009), such as inflammation (see table page 7). This client is in great amount of pain and he is getting irritable and aggressive in dealing with
it. Pain indicates inflammation. Iron is also required for oxygen transport and release. This may reason the shortness of breath he is experiencing. Iron overload can cause free radical damage and high acidic environment. This patient needs alkalizing foods such as green leafy vegetables. High ferritin may also be a sign of haemacromatosis, thought very rare. High iron in blood can mean low iron the body. Low iron can cause constant infections as iron is required to make antibodies and interleukins needed for

functioning immunity. The deficiency can be caused by low levels of hydrocholoric acid (HCL)in the stomach, thus causing poor absorption (Haas 2006). B12 deficiency can result if low HCL is present (Gropper et al 2005). B12 is used to generate folate, thus both are usually depleted. His heamoglobin is in a low range as well (147 out of 135-180), indicating anemia or erythrocytosis. Large red blood cells may indicate B12 deficiency in the long term. Low globulin ma
y also indicate chronic inflammation and infection (26 out of 20-40). His testosterone levels must be tested since low testosterone can cause more inflammation (Tang YJ et al. 2007), therefore causing pain. In addition, the genomics and metabolemics must be assessed to confirm that there are no functional issues to process food (eg. Phenylketonuria).

Interpretation of the results of iron studies

RCPA (2009)

Nutrient Markers

Stress, worries, sleeping difficulties and nocturnal urination

The research indicates that chronic stressors are suppressing cellular and humoral immunity (Segerstrom and Miller 2004). His GGT levels are down to lower end (19 put of 0-70) and may be a sign of prostatitis, pancreatis, liver disease or diabetes (RCPA 2009). Prostatitis may imitate urinary tract infection and cause nocturnal urination (Oxford 2007) that this client is experiencing.

Stress induced depression can cause adrenal dysfunction (Piccorno et al. 2008). This will present as fatigue. Stress can also be inflammatory, via induction of pro-inflammatory cytokines and CPR production (Calcogni et al. 2006). During the chronic stress cortisol binds to CNS receptors and results in continued secretion of cortisol (Tosevski and Milovancevic 2006). This client suffers from acne and cold sores during the stress periods.

A low amount of nutrient marker Homovanillate may indicate depression, sleep disturbance, anxiety and fatigue (Metametrix 2009). Support with protein and ensure digestion of protein is working. Address stress. A high 8-hydroxy-2-deoxyguanosine indicates the rate of damage to DNA induced by oxidative stress (Metametrix 2009). It rises naturally with age, high cholesterol and hypertension. Support with antioxidants, vitamin C, E, flavonoids, glutathione and cysteine.

His Formiminoglutamate indicates that he is not folate deficient; however, vitamin C protects folate and may be beneficial (Metametrix 2009) to protect from future deficiencies. 2-Methylhippurate can show solvent oxidized via P450 enzymes. Fuel fumes, dry cleaners, new cars, carpets and industrial solvents may result in oxidative stress, thus glycine supplement will aid with liver phase-2 detoxification. In addition, glycine may help to prevent bacterial deamination of amino acid phenylalanine to produce benzoate. If it is conjugated with glycine, it will produce hippurate. Also ensure B5 and probiotics intake. Pickles and lunch meats should be avoided as well as sugars limited. Intestinal bacterial action on phenylalanine causes the appearance of phenylacetate and phenylpropionate in urine.

Anger that this client is experiencing indicates "Type-A personality" that is also related to elevated chronic pain intensity. Those who learn to control anger reduce risk of heart disease (Pizzorno 2008). In addition, helplessness, the belief that nothing can be done to resolve the problem can influence pain sensations negatively. This patient needs to learn how to cope and manage his stress. The practitioner can encourage him to achieve specific goals and give him credit in the follow up consultations. Positive support will facilitate pain management (Marchand 2008).

Malabsorption and afternoon slump, irregular hunger signal

Accordin to Metametrix (2009), the clients B-Hydroxybutyrate is low. This may indicate that he cannot mobilize or metabolize glucose. This may indicate metabolic acidosis and diabetes. This Low B-Hydroxybutyrate can also result in fatigue after exercise. Balance blood sugar levels and implement chromium. In addition, low Ethylmalonate may point to hypoglycaemia, nausea, fatigue and weakness as well. Carnitine helps to derive energy from fat and needs riboflavin as a cofactor (Metametrix 2009). Pancreatic enzyme supplementation may be needed. Gastric buffer is alkalizing, thus may help the acid pain pattern (Osiecki 2008). Gastric buffer, such as lemon juice before meals, also help to utilize nutrients.

Gastrointestinal function, flora and mucosa

People with gluten sensitivity doesn't necessarily present with gastrointestinal (GIT) symptoms, but myopathy. Thus he must be tested for IgG levels. Gluten sensitizes the gut since the proteolytic fragments of wheat gluten induce maturation of dendritic cells and the secretion of some cytokines and chemokines (Nikulina 2004). Bloating and diarrhea indicate gut bacterial dysfunction and increased permeability; therefore susceptibility to inflammation is increased. The food allergies may cause mucosal permeability. He may benefit from Saccharomyces boulardii that is non-colonising probiotics yeast supplement recommended by Metametrix if the client's 3,4-Dihydroxyphenylprophionate is low, as it is in this case. Other beneficial nutrients are garlic, citrus seed extract and aloe vera juice.

Other causes for IBD-stress response may be paracites, microbial invation or physical trauma. Risk factors include high saturated fat and refined, processed food. Malabsorption can present as loose stool and anemia. Depletion of nutrients is evident if body is not able to absorb food. Two thirds of patients with IBS have food intolerances (Pizzorno et al. 2008) thus he should be tested. This patient has loose

stools that point to too fast transit time that causes irritation of the bowel. Stress aggravates IBS. Considering that the patients has a family history of arthritis it is pertinent to consider treating dysbiosis in the small intestine. Degree of dysbiosis is linked to severity of the arthritic symptoms (Pizzorno et al. 2008). Since he has genetic risk factors as well as possible abnormal bowel permeability, it is important to prevent the development of arthritis. Panamax aggravates GI-tract thus should be avoided.
Achlorhydria may cause indigestion and bacterial overgrowth in intestine. Achlorhydria is also associated with H.Pylory infections and low pepsin in the stomach. This can cause impaired ingestion of protein (Osiecki 2008). Consequently, the amino acids are poorly available, hence depression may occur. H-pylori may also indicate cardiovascular problems; and cause a chronic infection and inflammation. Chronic inflammation can lead to severe unrelated diseases and plays a role in the development of hypertension, atherosclerosis, depression, irritable bowel syndrome, functional digestive disorders and cancer (Edwards 2005). This patients white cell count is fairly low (5.7 out of 4.0-11.0). This may point toward infection, inflammation or malignancy (RCPA 2009). Iron is needed to secrete Hydrochloric acid (HCL) in the stomach. HCL ensures the absorption of nutrients and breaks down food. As mentioned before, HCL production can also be supported by ingesting warm lemon water
fifteen minutes before meals. Alternatively, one may take apple cider vinegar.
Gropper (2005) indicates that a lack of pyridoxine inhibits formation of cysteine from homocysteine. Therefore, overload of homocysteine may cause heart disease and hardening of the arteries (Kumar and Clark 2005). However, this patient has low total cholesterol. As mentioned before, low total cholesterol may mean acute infection or myocardial infarction.
Musculoskeletal/Family history of arthiritis
Pain down the leg is not always sciatic. Sacro-iliac pain is more to the side, but still radiate sto the back (Prolotherapy for Doctors 2009). In addition, certain foods such as citrus fruits, artificial sweeteners and spices can aggravate pain, thus should be avoided (Shorter et al. 2007). Avoid all identified food sensitivities.

Nutritional requirements

Currently taking: Recommended Dosages:
Panamax (as needed)
Fish Oil 1000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet every two days
B12/Folate 1 tablet daily
Vitamin C/daily
Lysine (as needed) Panamax (May cause gut symptoms and affecdt B12 intake (Osiecki 2007). Try magnesium supplemention for pain).
Fish Oil 3000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet twice a day
B12 300-8000 ug/day (Achlorhydria,acne, bowel incontinence, CVD, pancreatic insufficiency, cold sores, cognitive impairment)
Folate 1-5mg/day (acne, atheroscelerosis, diabetes, fatique, stress, zinc deficiency)
Vitamin C/2000 mg daily
Lysine 3000mg/day when cold sores are present

Nutrients and phytochemicals needed Rationale/functions facilitated Food source of the nutrient/ phytochemical
Lipoic acid Tissue ischaemia, mitochondrial dysfunction, nerve support Broccoli, kidney, liver, potatoes, spinach, tomatoes
Carnitine Tissue ischaemia, mitochondrial dysfunction Avocado, beef, chicken, fish, milk, liver
Green leafy vegetables Tissue acidity, alkalising Green leafy vegetables
GABA/glutamate Brain: endogenous pain modulation, neural inflammation, sleep improvement, Skeletal muscle Glutamine: Beans, cottage cheese, dairy, legumes, sausage meat, most protein sources, ricotta, rolled oats
Phenyl alanine/tyrosine Brain: endogenous pain modulation (dopamine, noradrenaline, adrenaline), adrenal insufficiency, mild-moderate depression, neural inflammation, stress relief, physical and mental fatique associated with stress, short term memory, perceptual motor skill n(Deijen et al. 1999) Phe: Almonds, avocado, banana, brown rice, cottage cheese, eggs, fish, herrings, lentils, meat, nuts
Tyr: Almonds, avocado, banana, beans, pumpkin seeds
5-HTP Brain: endogenous pain modulation, neural inflammation, stress relief, immediate precursor to

serotonin, reduces overall sensation of pain, suppresses appetite and promotes restful sleep. Derived from amino acid tryptophan. Tryptophan rich foods:
Bananas, beef, beans, dairy, cottage cheese, fish, legumes, lentils, oats, pumpkin seeds, sesame seeds

EPA/DHA Anti-inflammatory, reduce risk of heart disease, lower LDL and triglycerides, inhibit platelet aggregation, lower fibrinogen levels, lower systolic and diastolic blood pressure. Lowers rate of myocardial infarction (MI) (Pizzorno 2008). Fish oil
Calcium Arthiritis, backache, bone pain, cramps Almonds, broccoli, buckwheat, egg yolk, green leafy vegetables, molasses, sardines, turnips
Magnesium Muscle relaxant, neurotransmitter support, calm the mind, essential to cardiovascular functioning, prevent heart disease and stroke, dilates coronary arteries, reduces peripheral vascular resistance (Pizzorno 2008). Decreases analgesic requirements (Lysakowski et al. 2007). Acholorhydria, athletes, chronic fatigue, soft tissue calcification (Osiecki 2007). Almonds, cashew's, cocoa, cod, lima beans, figs, mineral water, molasses, parsnips, kelp, eggs, seeds.
Malic acid Physical exhaustion, muscular pain, improves mitochondrial respiration, intermediate in Kreb's cycle, endurance for athlete training Apples, currants, most tart fruits
Curcuma Anti-inflammatory, inhibits TNF-alpha, antioxidant activity, potent inhibitor of nuclear factor kappa-B, may be useful as a powerful anti-depressant agent (Xu et al. 2005) Turmeric
Allicin Anti-inflammatory, inhibit platelet aggregation, increases microcirculation of the skin, decreases plasma viscosity Garlic
Gingerol Anti-inflammatory, inhibits pro-inflammatory cytokines: IL-12, TNF-alpha, IL-1-beta, MCP-1, and RANTES Ginger
Quercetin Anti-inflammatory Onion
Cloves Inhibit leukotrienes, arachodonic acid and stimulate PMNL cells Cloves
Anthocyanins Exhibit anti-inflammatory properties via inbiting COX activities and scavenging of the reactive nitric oxide radical (NO) Cherries
Polyphenols including phenolic acid, flavonoids, stibenes and lignans Specific anti-oxidants affect nuclear factor kappa-B, inducible NO expression, COX inhibition and defend against advanced glycation end products (AGEs) Fruit, vegetables, green tea and plant foods
Nuts and seeds Plasma levels of C-reactive protein, interleukin-6, and fibrinogen Nuts and seeds
Acid supplement, betaien HCL, pancreatic enzymes and bitters foods Improve gastric acid and bile production.
Bile helps to break down fat.
Gastric acid helps to breakdown food in a stomach. Stimulates absorption of nutrients and is the most important non-immunological defense system against microbes (Osiecki 2008). Bitter foods, such as rocket help to increase bile.
Lemonjuice or apple cider vinegar 15 minutes before meals
Supplement
Pro-biotic Supplement with immune enhancing pro-biotic. Improves bowel flora. Improves gut barrier functions.
Increase beneficial intestinal bacteria, prevent leaking of unwanted toxins from the bowel back to bloodstream.
Fibre Improves bowel flora, repairs gut wall, soluble fibre reduces cholesterol, promotes weight loss, enhance glycaemic control, decrease insulin levels, reduces calories absorbed (Pizzorno et al. 2008). Psyllium husks, whole meal products, unrefined flour, glucomannan, gum karaya, chitin, guar gum, pectin
Glutamine Precursor to GABA, promotes healing and bowel rescue (Osiecki 2007). Immune enhancer, improves IgA levels. Intestinal impermeability. Villi atrophy. Poor concentration. Wound healing. Cottage cheese, legumes, sausage meat, rolled oats, beans
Phytochemicals, carotenes, lycopene, lutein Protect against heart disease, slow down the aging process, antioxidant, less dense LDL particles (Pizzorno 2008) Red and orange vegetables, roma tomatoes
Resveratrol and flavonoids Protect gainst LDL oxidation Redwine, organic grapejuice
Vitamin C Partners with vitamin E and carotenes and regenerates COQ10. Reduces risk of death from MI and stroke. Lower triglycerides, strengthen arterial collagen, lower BP, higher HDL, promote fibrinolysis, reduce markers of inflammation, inhibiting platelet aggregation Supplement. Food: Black currants, aloe vera juice, broccoli, brussel sprouts, citrus fruit, guava, parsley, pawpaw, peppers, pineapple, potatoes, raw cabbage, rosehips, strawberries, sweet potatoes, tomatoes

Vitamin A Skin, maintain tight junction function between cells, thus help to neutralize the hydrogen ion at the tissue level. Alkalising. Correction of acidosis Apricots, barley grass, butter, carrots, fish liver oils (cod, salmon, halibut), green leafy vegetables, kohlrabi (German turnip), liver, mint, egg yolk
B6, B12 and folate Increase the dose of B12 and folate. Preventing homocysteine from clogging the

arteries. B6=avocado, banana, carrot
B12=egg yolk, herring, meat
Folate=beans, eggs, sprouts
B5 Adrenal stress, nervousness, polyneuritis, poor immunity, arthritis, skin disease Avocado, egg yolk, green vegetables, mushroom, oranges, peas
Taurine Anxiety, fat malabsorption, heart function, sperm motility Eggs, animal protein
Glycine Detox salicylates, possible arthritis, reduces residual volume in the bladder (Osiecki 2007), leg ulcers (he has sores in legs), inflammation, poor digestion, neurotoxic cell death, wound healing, spinal injuries, stroke Gelatine, most protein, beans, brewer's yeast, eggs, fish, seafood, lactalbumin, nuts, whey protein
Arginine In a presence of glycine arginine is wound healing Almond, beans, carob, cashews, garlic, peas, pecans, sea food
Chromium Body building, coronary artery disease, hyperglycaemia, elevated intake of glucose or refined carbohydrates Asparagus, apples, egg yolk, mushrooms, nuts, oysters, potato, prunes, unprocessed wheat (35-45% loss in refining flour).

Dietary Plan
In lean person, a meal stimulates up to a 40% increase in diet induced thermogenesis. Overweight person stimulates just 10% and in the obese energy is stored and not converted into heat at all (Pizzorno et al. 2008). The patient's current BMI (Basal Metabolic Index) is 31.6. To obtain a ideal BMI level of 23 the patient needs to weigh approximately 52-69kg.
BMI=Weight Kg/ (Height)2
Recommended BMI=23
23=X kg/2.7556m
Xkg=23x2.7556
Xkg=63.4kg is the recommended weight for this patient.
Protein requirement
Ideal weight x 0.9 x Exercise factor
63.4 x 0.9 x 1.2
68.9g of protein/day
According to Gropper (2005), the recommended protein requirement is 56 grams/day for a male aged 31-50. However, since he is obese he may require more protein. The amount of protein in foods varies and client need to be educated how much protein is in each meal. With his old diet the total protein intake was 20%. In contrast to the new diet has 32% protein. Protein uptake can be enhanced with a protein shake or a protein bar snack.
Carbohydrates and fiber
Excess carbohydrates are converted to fat and ideally total carbohydrates of the total diet should be 30%. He is lacking protein and essential fatty acids, thus the ration should be protein 40% and fat 30%. The ratio of the protein, fat and carbohydrates for the new diet is protein 32%, fat 37% and carbohydrates 31%. The old diet showed excess carbohydrates with 40% of carbohydrates, 40% of fat and only 20% protein like mentioned above. There was a significant drop in carbohydrate intake from 180.130 to 92.305. Fiber increased from 22.435 to 31.408. However, fiber to reach 100% intake, he needs to increase fiber for 17%. This may be done by adding a psyllium husks or slippery elm drink on a daily diet. These products were not included into Foodworks program, thus were not included into diet calculations. The old diet was high in GI and sodium. Improved new diet had 760.342 sodium, compared to the old one 2461.71.

Energy expenditure
Ratio energy from protein is 20%, whereas fat and carbohydrates are 40%. He does not drink alcohol, thus no energy is from alcohol. In the new diet the energy from protein ranges between 32-37% for the breakfast and dinner. Energy DF with new diet was 5299.063k/j; the old diet instead, had 7753.470k/j of Energy DF.
Fat Ratio
54% of the fat with the old diet was from saturated fats while with the new diet provided a lot lower saturated fat ratios in all meals was achieved; ranging from 17-37% (including breakfast, morning tea, lunch, afternoon tea and dinner). Saturated fat having medium-length chains, along with unsaturated trans fatty acids, are hypercholesterolemic, while mono and polysaturated cis fats tend to lower serum cholesterol (Gropper 2005). New diet ratios for fat were: Poly 37%, mono 40% and saturated 23%. Old diet: poly 13%, mono 34% and saturated 54%. This signifies the improvement for healthy fat ratio in the innovative diet. Fat in total with the old diet was 40%, whereas with the new one it was 37%. The

amount of fat can be 40%, as long as it comes in easily digestible sources and forms. Saturated fat in grams reduced from 41.01g to 9.968g with the new diet.
The following foods are essential in this clients diet:

- Onions, garlic, ginger and turmeric
- High fibre
- Nuts, seeds
- Slippery elm, Aloe vera juice
- Lean meat such as kangaroo
- Dark green leafy vegetables (bok choy, rocket, kale)
- Oily fish (mackerel, salmon)
- Brown rice
- Maintain hydration 2-3 litres/day
- Eat 5-6 small meals a day
- Always eat the protein portion of the meal first and have protein in each meal

Recommended diet

Meal Time Meal contents

Breakfast 7am Sardines, spinach, mushroom, tomato,onion, ryebread

Morning Tea 10.30 Boiled egg and apple

Lunch 1pm Borsch Soup: beetroot, red cabbage, carrot, onion, celery, water, garlic, black pepper, kangaroo meat

Afternoon tea 3pm Bornhoffen yogurt, berries, LSA mix, psyllium husks

Dinner 6pm Salmon cooked in olive oil and garlic, Kippfler potato mash with lime juice, served on the bed of rocket, lemonjuice, pinenuts, snowpeas, cucumber, red capsicum, white peppar, cherry tomatoes and fresh basil leaves.

Fluids Water (2.5l), 1 cup of green tea, 1 cup of rooibos tea

Total Daily Calorie Value (Foodworks 2009)

Dietary calculator (Shoring 2009) shows this patient needs total of 4120.20 Kcal per/day to maintain homeostasis. The new diet sustain 2454.407 Kcal reduction that be supposed to weight loss, thus help in the treatment of this client. His Total Energy Requirement indicated in Dietary Calculator (see appendix), is 2608.2. His Protein Intake requirement is 1.4 with his level of Exercise Factor (recommended range 1.1-1.5). This is 26.46 gm per meal (Dietary Calculator 2009) According to Dietary Calculator (2009) his fat intake per meal should be 31.20 gm. Recommended carbohydrate intake is 111.28/per meal. However, this amount of carbohydrates can be debatable in obese people.
Previous macronutrient percentages and breakdown of fat are shown in Food Record 2, pg. 6. At present the diet is high in saturated fat (54%) and refined, processed carbohydrates (40%) that are acidifying the body (see appendix Food Record 2 pg. 6). Seaman (2002) supposed that people literally eat themselves into inflamed state by consuming pro-inflammatory foods. He needs to reduce grains and increase fruit and vegetables (Frassetto 2006). Low nutritional value in combination with high saturated fat is contributing to the patient's condition. He needs to increase anti-inflammatory fat such as omega 6. He will benefit from high protein diet that will prevent muscle wasting and fatigue also. Uptake of amino acids by the skeletal muscles readily occurs following protein-containing meal (Gropper 2005).
White fat cells aggravate blood sugar imbalance and promote atheroscelerosis (Pizzorno et al. 2008). Brown fat instead helps to increase capacity to metabolize fats (Pizzorno et al. 2008). Obese person have less brown fat, thus energy is stored instead of turned into heat. Thermogenesis needs to be increased by enhancing insulin sensitivity. This can be done by controlling hyperglycemia with chromium based foods (see Nutritional Requirements, pg 15). Chromium is a component of Glucose Tolerance Factor (GTF) and aids glucose metabolism. Approximately 56% of the population is at risk of being Chromium deficient (Osiecki 2007). Chromium also may reduce total cholesterol, triglycerides and high density lipoprotein. Supplementation of chromium lower white fat in the body and increase lean body mass by increasing insulin sensitivity (Pizzorno et al. 2008).

Conclusion

This treatment protocol is designed to ease of the patient's pain, enhance immune system, reduce inflammation and simultaneously reduce the emotional symptoms. Nutritional deficiencies can deplete energy levels thus contributing to pain tolerance factors. Antioxidant mechanisms in the body act synergistically as the best line of defense against free radical attack (ARL 2009). The body possesses a number of mechanisms to control the production of reactive oxygen species and to limit or repair the damage to tissues. By changing the diet the regulation of neurotransmitters is also enhanced, thus normal sleep pattern is restored also. It would be beneficial for the patient to reduce medication that may contribute to gastro intestinal symptoms. The implementation of the nutritious diet may help to reduce stress like symptoms and improve his overall health. Compliancy of the client is important and the results will be quicker if he is able to adapt to the changes. The client needs to be

educated how to prepare food (excess oils, nutrient losses) and adulteration of the diet. Intake and also the portion sizes are important as well as how the food is absorbed individually. Energy usage must be calculated into ones diet. It is wise to consider organic food, since the level of phytochemicals and isoflavones varies according to how the food is grown. Dietary mod
ification and nutritional supplementation appear to be the only treatments that can tackle the underlying cause, which is diet-induced pro-inflammatory state.

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Appendices

1. Food works/Food record 2
2. Dietary calculator

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Executive Summary

The patient is presenting with chronic lower back and neck pain. Concomitantly he suffers from constant fatigue, general lethargy and decreased motivation characterized with signs of poor concentration, memory and mental alertness. He is obese with a BMI of 31.6. He is taking Panamax painkillers weekly to reduce the pain that is irritating him. He also experience acne and cold sores when stressed. Sores on limbs and back take a while to heal. He is ill with fatigue when sitting in the evening and immediately after exercise. He cycles 25 km daily and his lower limbs are weak. After a sinus and chest infection month ago, he developed SOB. He have also gained 3kg since he stopped cycling week ago. On further examination of blood tests, amoni acid profiles, allergy testing and diet analysis it shows many nutritional deficiencies pertinent in the maintenance of energy, functioning immunity, mental processors and general wellbeing. If this patient continues his poor diet there

would be no improvement to his condition. Through implementation of the diet outlined on the page 17, the patient will see improvement in energy, weight, sleep and immune function. The nutrients listed from page 11-15 are also significant and the list beneficial foods was created to guide client into eating right foods. An improvement in his simultaneous symptoms of dysphagia, indigestion, bad dreams, worries and aggression will also benefit from this treatment.

Introduction

The patient is a 35 yr old male physiotherapy assistant. He has presented with chronic lower back pain with coexistent fatigue, dysphasia, acne, cold sores, SOB (which started 1 month ago after sinus and chest infection), lethargy, decreased motivation and tunnel vision. He suffered from a bulging disk in lumbar vertebrae in 1992. The patients energy levels are low, 3/10 and worries about the future, due to chronic illness. He has bad dreams and wakes to urinate around 3.30am. Currently he is medicated with Panamax and and variety of nutritional supplements listed on page 10.

Low back pain is a common symptom (Kumar and Clark 2005), and it is often work related. Causes of the pain in the lumbar region may be mechanical, inflammatory, metabolic or neoplastic. Orthodox treatment varies from analgesics and muscle relaxants to physical manipulation. It has been said that psychological and social factors may influence the time of presentation (Kumar and Clark 2005). Scoliosis may be present and mechanical lower back pain present s as visible muscle spasm the pain is palpable. Mechanical pain lessens when sitting or lying, thus further questioning about the pain is needed. According to Kumar and Clark, the source of pain may be a disk, posterior facet joints, spinal ligaments or muscles. Back pain is difficult to diagnose, however is often related to radiological spondylosis. Lower back pain may also be caused by poor posture and unsupportive chairs. Acute lumbar disc prolapse is usually unilateral; thus not relevant since this patient presents with ac
hing in back of both legs. Lumbar nerve root entrapment in L5/S1 may present at posterior calf (Kumar and Clark 2005). Progressive loss off disc height and osteoarthritis contribute to root canal stenosis and causes buttock and bilateral leg pain. In addition, facet joint pain present as buttock and posterior thigh pain.

Way people perceive stress is also influence pain sensations. Negative expectations may result in the amplification of the pain. There is now behavioral evidence that brain is capable of exerting powerful clinically significant influences on the descending facilitatory pathways (Meeus et al. 2007). It is believed that cognitions, emotions, attention and motivation have influence on the clinical pain experience. Stress can also create gastro intestinal symptoms and is commonly associated with Irritable Bowel Syndrome (IBS). The brain and gut connection share many nerve endings and chemical transmitters (Osiecki 2008). This client is suffering from variety of gut symptoms as well as fatigue. He does a lot of exercise; however has lately felt exhausted after. This patient may need referral to the doctor for further testing, since he feels fatigue when sitting. This may be assign of heart condition or asthma.

Diagnosis

Nutritional Deficiencies

It is important to fix the diet first and then combine with possible supplementation. The aims of this treatment are to treat inflammatory pathway to release any tight muscles that may cause lower back and neck pain. This patient may not be absorbing the nutrients he is taking, due to low Hydrochloric acid (HCL) levels in the stomach and insufficient pancreatic enzyme function, thus enzyme supplementation may be needed.

Nutrient Deficiency Associated with

Magnesium Anxiety, arterioscelerosis (FX of CVD), behavioral disturbances, chronic fatigue, confusion, enhanced free radical damage, irritability. Used to treat insulin resistance.

Iron Low immunity: Maintain normal immune function, manufacture antibodies and interleukins, avoid low HCL (Osiecki 2007).

B12 Deficiency of B12 and iron may result if HCL levels in a stomach are low. Deficiency may cause fatigue, memory loss, negativism and irritability(Osiecki 2007). Factors increasing demand are bacterial overgrowth in the gut, diabetes, gastric mucosal atrophy and pancreatic insuffieciency.

Pyridoxine Hardening of the arteries may be caused by high homocysteine levels. Pyridoxine is needed to convert homocysteine to cysteine (FX of CVD).

Zinc Zinc is used to treat achlorhydria, viral infections, poor appetite, pancreatic enzyme insuffieciency and stress. Deficiency may cause acne, low testosterone, low white blood cells, impaired wound healing, moodiness and sleep problems.

Calcium Back pain, agitation, cognitive impairment, irritability, osteomalacia, sciatica, spinal curvature.

Vitamin A Need A to release Fe to ferritin. Deficiency may cause or be associated with acne. It is also associated with vision, gene transcription, immune function, embryonic development and reproduction, bone metabolism, haematopoiesis, skin health and antioxidant activity (Combs, G. F. 2008).

Nail, skin, eye, tongue, weist hip ratio, irregular hunger signal, bad dreams, bloating after meals and low energy after lunch

Nail Vertical ridges=silica, protein malabsorption (Armstrong 2000).

Skin Acne: Zinc and vitamin A deficiency, EFA deficiency; lesions in legs. Cold sores=low immunity,

stress
Eye Grey stomach zone indicates low HCL in the stomach. Lympahatic rosary=long standing lymphatic stasis, metabolic waste accumulation. Scurf Rim=toxins in the body coming out of skin (silica), under activity, encourage sweating (Armstrong 2000). Broken ANW may indicate leaky gut syndrome.
Tongue Scalloped tongue indicates digestive problems and liver stagnation. Red tip=Niacin deficiency (Osiecki 2008). Also it may indicate heart problems. Pale coat can indicate low HCL, lack of hunger signal, food may sit heavily, needs enzymes, digestive under activity (Armstrong 2000).
Waist hip ration Waist hip ration over 80 = CVD risk

Irregular hunger signal Zinc deficiency
Bad dreams Not digesting food properly, Irritable bowel syndrome
Bloating after meals Dysbiosis and small intestinal bacterial overgrowth (Pizzorno et al. 2008).
Low energy after lunch Blood sugar imbalance due to high GI foods. Can be balanced via low GI high protein diet. He may have insulin resistance. Hypoglycaemia.
FX=family history, CVD=cardiovascular disease, GI=glycemic index

Blood test
The patient has high Anion Gap that indicates metabolic acidosis and diarrhea (RCPA 2009), however it is still in recommended range and may not need attention just yet. Weakly acne when shaving indicates low immune system. His lymphocyte count is fairly low 1.7 compared to reference range 1.1-4.0, thus this may indicate drug abuse, lymphomas, HIV, low T-cells and B-cells or leukemia (RCPA 2009). The patient's total cholesterol is low 3.5 (3.6-7.3). Levels are reduced for up to 8 weeks with acute illness (eg, myocardial infarction, acute infection) and assessment should not be attempted during this time (RCPA 2009). Considering he has family history of cardiovascular disease and general fatigue even when sitting, may indicate he has heart issues. This clients S-Ferritin is high. Increased levels occur in acute phase response (RCPA 2009), such as inflammation (see table page 7). This client is in great amount of pain and he is getting irritable and aggressive in dealing with
it. Pain indicates inflammation. Iron is also required for oxygen transport and release. This may reason the shortness of breath he is experiencing. Iron overload can cause free radical damage and high acidic environment. This patient needs alkalizing foods such as green leafy vegetables. High ferritin may also be a sign of haemacromatosis, thought very rare. High iron in blood can mean low iron the body. Low iron can cause constant infections as iron is required to make antibodies and interleukins needed for functioning immunity. The deficiency can be caused by low levels of hydrocholoric acid (HCL)in the stomach, thus causing poor absorption (Haas 2006). B12 deficiency can result if low HCL is present (Gropper et al 2005). B12 is used to generate folate, thus both are usually depleted. His heamoglobin is in a low range as well (147 out of 135-180), indicating anemia or erythrocytosis. Large red blood cells may indicate B12 deficiency in the long term. Low globulin ma
y also indicate chronic inflammation and infection (26 out of 20-40). His testosterone levels must be tested since low testosterone can cause more inflammation (Tang YJ et al. 2007), therefore causing pain. In addition, the genomics and metabolemics must be assessed to confirm that there are no functional issues to process food (eg. Phenylketonuria).
Interpretation of the results of iron studies
RCPA (2009)
Nutrient Markers
Stress, worries, sleeping difficulties and nocturnal urination
The research indicates that chronic stressors are suppressing cellular and humoral immunity (Segerstrom and Miller 2004). His GGT levels are down to lower end (19 put of 0-70) and may be a sign of prostatitis, pancreatis, liver disease or diabetes (RCPA 2009). Prostatitis may imitate urinary tract infection and cause nocturnal urination (Oxford 2007) that this client is experiencing.
Stress induced depression can cause adrenal dysfunction (Piccorno et al. 2008). This will present as fatigue. Stress can also be inflammatory, via induction of pro-inflammatory cytokines and CPR production (Calcogni et al. 2006). During the chronic stress cortisol binds to CNS receptors and results in continued secretion of cortisol (Tosevski and Milovancevic 2006). This client suffers from acne and cold sores during the stress periods.
A low amount of nutrient marker Homovanillate may indicate depression, sleep disturbance, anxiety and fatigue (Metametrix 2009). Support with protein and ensure digestion of protein is working. Address stress. A high 8-hydroxy-2-deoxyguanosine indicates the rate of damage to DNA induced by oxidative stress (Metametrix 2009). It rises naturally with age, high cholesterol and hypertension. Support with antioxidants, vitamin C, E, flavonoids, glutathione and cysteine.
His Formiminoglutamate indicates that he is not folate deficient; however, vitamin C protects folate and may be beneficial (Metametrix 2009) to protect from future deficiencies. 2-Methylhippurate can show solvent oxidized via P450 enzymes. Fuel fumes, dry cleaners, new cars, carpets and industrial solvents

may result in oxidative stress, thus glycine supplement will aid with liver phase-2 detoxification. In addition, glycine may help to prevent bacterial deamination of amino acid phenylalanine to produce benzoate. If it is conjugated with glycine, it will produce hippurate. Also ensure B5 and probiotics intake. Pickles and lunch meats should be avoided as well as sugars limited. Intestinal bacterial action on phenylalanine causes the appearance of phenylacetate and phenylpropionate in urine.
Anger that this client is experiencing indicates "Type-A personality" that is also related to elevated chronic pain intensity. Those who learn to control anger reduce risk of heart disease (Pizzorno 2008). In addition, helplessness, the belief that nothing can be done to resolve the problem can influence pain sensations negatively. This patient needs to learn how to cope and manage his stress. The practitioner can encourage him to achieve specific goals and give him credit in the follow up consultations. Positive support will facilitate pain management (Marchand 2008).
Malabsorption and afternoon slump, irregular hunger signal
Accordin to Metametrix (2009), the clients B-Hydroxybutyrate is low. This may indicate that he cannot mobilize or metabolize glucose. This may indicate metabolic acidosis and diabetes. This Low B-Hydroxybutyrate can also result in fatigue after exercise. Balance blood sugar levels and implement chromium. In addition, low Ethylmalonate may point to hypoglycaemia, nausea, fatigue and weakness as well. Carnitine helps to derive energy from fat and needs riboflavin as a cofactor (Metametrix 2009). Pancreatic enzyme supplementation may be needed. Gastric buffer is alkalizing, thus may help the acid pain pattern (Osiecki 2008). Gastric buffer, such as lemon juice before meals, also help to utilize nutrients.
Gastrointestinal function, flora and mucosa
People with gluten sensitivity doesn't necessarily present with gastrointestinal (GIT) symptoms, but myopathy. Thus he must be tested for IgG levels. Gluten sensitizes the gut since the proteolytic fragments of wheat gluten induce maturation of dendritic cells and the secretion of some cytokines and chemokines (Nikulina 2004). Bloating and diarrhea indicate gut bacterial dysfunction and increased permeability; therefore susceptibility to inflammation is increased. The food allergies may cause mucosal permeability. He may benefit from Saccharomyces boulardii that is non-colonising probiotics yeast supplement recommended by Metametrix if the client's 3,4-Dihydroxyphenylprophionate is low, as it is in this case. Other beneficial nutrients are garlic, citrus seed extract and aloe vera juice.
Other causes for IBD-stress response may be paracites, microbial invation or physical trauma. Risk factors include high saturated fat and refined, processed food. Malabsorption can present as loose stool and anemia. Depletion of nutrients is evident if body is not able to absorb food. Two thirds of patients with IBS have food intolerances (Pizzorno et al. 2008) thus he should be tested. This patient has loose stools that point to too fast transit time that causes irritation of the bowel. Stress aggravates IBS. Considering that the patients has a family history of arthritis it is pertinent to consider treating dysbiosis in the small intestine. Degree of dysbiosis is linked to severity of the arthritic symptoms (Pizzorno et al. 2008). Since he has genetic risk factors as well as possible abnormal bowel permeability, it is important to prevent the development of arthritis. Panamax aggravates GI-tract thus should be avoided.
Achlorhydria may cause indigestion and bacterial overgrowth in intestine. Achlorhydria is also associated with H.Pylory infections and low pepsin in the stomach. This can cause impaired ingestion of protein (Osiecki 2008). Consequently, the amino acids are poorly available, hence depression may occur. H-pylori may also indicate cardiovascular problems; and cause a chronic infection and inflammation. Chronic inflammation can lead to severe unrelated diseases and plays a role in the development of hypertension, atherosclerosis, depression, irritable bowel syndrome, functional digestive disorders and cancer (Edwards 2005). This patients white cell count is fairly low (5.7 out of 4.0-11.0). This may point toward infection, inflammation or malignancy (RCPA 2009). Iron is needed to secrete Hydrochloric acid (HCL) in the stomach. HCL ensures the absorption of nutrients and breaks down food. As mentioned before, HCL production can also be supported by ingesting warm lemon water
fifteen minutes before meals. Alternatively, one may take apple cider vinegar.
Gropper (2005) indicates that a lack of pyridoxine inhibits formation of cysteine from homocysteine. Therefore, overload of homocysteine may cause heart disease and hardening of the arteries (Kumar and Clark 2005). However, this patient has low total cholesterol. As mentioned before, low total cholesterol may mean acute infection or myocardial infarction.
Musculoskeletal/Family history of arthiritis
Pain down the leg is not always sciatic. Sacro-iliac pain is more to the side, but still radiate sto the back (Prolotherapy for Doctors 2009). In addition, certain foods such as citrus fruits, artificial sweeteners and spices can aggravate pain, thus should be avoided (Shorter et al. 2007). Avoid all identified food sensitivities.

Nutritional requirements

Currently taking: Recommended Dosages:
Panamax (as needed)

Fish Oil 1000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet every two days
B12/Folate 1 tablet daily
Vitamin C/daily
Lysine (as needed) Panamax (May cause gut symptoms and affecdt B12 intake (Osiecki 2007). Try magnesium supplemention for pain).
Fish Oil 3000mg/day
Centrum 1-2tablets/day
Inner Health Plus 1 tablet twice a day
B12 300-8000 ug/day (Achlorhydria,acne, bowel incontinence, CVD, pancreatic insufficiency, cold sores, cognitive impairment)
Folate 1-5mg/day (acne, atheroscelerosis, diabetes, fatique, stress, zinc deficiency)
Vitamin C/2000 mg daily
Lysine 3000mg/day when cold sores are present

Nutrients and phytochemicals needed Rationale/functions facilitated Food source of the nutrient/ phytochemical
Lipoic acid Tissue ischaemia, mitochondrial dysfunction, nerve support Broccoli, kidney, liver, potatoes, spinach, tomatoes
Carnitine Tissue ischaemia, mitochondrial dysfunction Avocado, beef, chicken, fish, milk, liver
Green leafy vegetables Tissue acidity, alkalising Green leafy vegetables
GABA/glutamate Brain: endogenous pain modulation, neural inflammation, sleep improvement, Skeletal muscle Glutamine: Beans, cottage cheese, dairy, legumes, sausage meat, most protein sources, ricotta, rolled oats
Phenyl alanine/tyrosine Brain: endogenous pain modulation (dopamine, noradrenaline, adrenaline), adrenal insufficiency, mild-moderate depression, neural inflammation, stress relief, physical and mental fatique associated with stress, short term memory, perceptual motor skill n(Deijen et al. 1999) Phe: Almonds, avocado, banana, brown rice, cottage cheese, eggs, fish, herrings, lentils, meat, nuts
Tyr: Almonds, avocado, banana, beans, pumpkin seeds
5-HTP Brain: endogenous pain modulation, neural inflammation, stress relief, immediate precursor to serotonin, reduces overall sensation of pain, suppresses appetite and promotes restful sleep. Derived from amino acid tryptophan. Tryptophan rich foods:
Bananas, beef, beans, dairy, cottage cheese, fish, legumes, lentils, oats, pumpkin seeds, sesame seeds

EPA/DHA Anti-inflammatory, reduce risk of heart disease, lower LDL and triglycerides, inhibit platelet aggregation, lower fibrinogen levels, lower systolic and diastolic blood pressure. Lowers rate of myocardial infarction (MI) (Pizzorno 2008). Fish oil
Calcium Arthiritis, backache, bone pain, cramps Almonds, broccoli, buckwheat, egg yolk, green leafy vegetables, molasses, sardines, turnips
Magnesium Muscle relaxant, neurotransmitter support, calm the mind, essential to cardiovascular functioning, prevent heart disease and stroke, dilates coronary arteries, reduces peripheral vascular resistance (Pizzorno 2008). Decreases analgesic requirements (Lysakowski et al. 2007). Acholorhydria, athletes, chronic fatigue, soft tissue calcification (Osiecki 2007). Almonds, cashew's, cocoa, cod, lima beans, figs, mineral water, molasses, parsnips, kelp, eggs, seeds.
Malic acid Physical exhaustion, muscular pain, improves mitochondrial respiration, intermediate in Kreb's cycle, endurance for athlete training Apples, currants, most tart fruits
Curcuma Anti-inflammatory, inhibits TNF-alpha, antioxidant activity, potent inhibitor of nuclear factor kappa-B, may be useful as a powerful anti-depressant agent (Xu et al. 2005) Turmeric
Allicin Anti-inflammatory, inhibit platelet aggregation, increases microcirculation of the skin, decreases plasma viscosity Garlic
Gingerol Anti-inflammatory, inhibits pro-inflammatory cytokines: IL-12, TNF-alpha, IL-1-beta, MCP-1, and RANTES Ginger
Quercetin Anti-inflammatory Onion
Cloves Inhibit leukotrienes, arachodonic acid and stimulate PMNL cells Cloves
Anthocyanins Exhibit anti-inflammatory properties via inbiting COX activities and scavenging of the reactive nitric oxide radical (NO) Cherries
Polyphenols including phenolic acid, flavonoids, stibenes and lignans Specific anti-oxidants affect nuclear factor kappa-B, inducible NO expression, COX inhibition and defend against advanced glycation end products (AGEs) Fruit, vegetables, green tea and plant foods
Nuts and seeds Plasma levels of C-reactive protein, interleukin-6, and fibrinogen Nuts and seeds

Acid supplement, betaien HCL, pancreatic enzymes and bitters foods Improve gastric acid and bile production.
Bile helps to break down fat.
Gastric acid helps to breakdown food in a stomach. Stimulates absorption of nutrients and is the most important non-immunological defense system against microbes (Osiecki 2008). Bitter foods, such as rocket help to increase bile.
Lemonjuice or apple cider vinegar 15 minutes before meals
Supplement
Pro-biotic Supplement with immune enhancing pro-biotic. Improves bowel flora. Improves gut barrier functions.
Increase beneficial intestinal bacteria, prevent leaking of unwanted toxins from the bowel back to bloodstream.
Fibre Improves bowel flora, repairs gut wall, soluble fibre reduces cholesterol, promotes weight loss, enhance glycaemic control, decrease insulin levels, reduces calories absorbed (Pizzorno et al. 2008). Psyllium husks, whole meal products, unrefined flour, glucomannan, gum karaya, chitin, guar gum, pectin
Glutamine Precursor to GABA, promotes healing and bowel rescue (Osiecki 2007). Immune enhancer, improves IgA levels. Intestinal impermeability. Villi atrophy. Poor concentration. Wound healing. Cottage cheese, legumes, sausage meat, rolled oats, beans
Phytochemicals, carotenes, lycopene, lutein Protect against heart disease, slow down the aging process, antioxidant, less dense LDL particles (Pizzorno 2008) Red and orange vegetables, roma tomatoes
Resveratrol and flavonoids Protect gainst LDL oxidation Redwine, organic grapejuice
Vitamin C Partners with vitamin E and carotenes and regenerates COQ10. Reduces risk of death from MI and stroke. Lower triglycerides, strengthen arterial collagen, lower BP, higher HDL, promote fibrinolysis, reduce markers of inflammation, inhibiting platelet aggregation Supplement. Food: Black currants, aloe vera juice, broccoli, brussel sprouts, citrus fruit, guava, parsley, pawpaw, peppers, pineapple, potatoes, raw cabbage, rosehips, strawberries, sweet potatoes, tomatoes

Vitamin A Skin, maintain tight junction function between cells, thus help to neutralize the hydrogen ion at the tissue level. Alkalising. Correction of acidosis Apricots, barley grass, butter, carrots, fish liver oils (cod, salmon, halibut), green leafy vegetables, kohlrabi (German turnip), liver, mint, egg yolk
B6, B12 and folate Increase the dose of B12 and folate. Preventing homocysteine from clogging the arteries. B6=avocado, banana, carrot
B12=egg yolk, herring, meat
Folate=beans, eggs, sprouts
B5 Adrenal stress, nervousness, polyneuritis, poor immunity, arthritis, skin disease Avocado, egg yolk, green vegetables, mushroom, oranges, peas
Taurine Anxiety, fat malabsorption, heart function, sperm motility Eggs, animal protein
Glycine Detox salicylates, possible arthritis, reduces residual volume in the bladder (Osiecki 2007), leg ulcers (he has sores in legs), inflammation, poor digestion, neurotoxic cell death, wound healing, spinal injuries, stroke Gelatine, most protein, beans, brewer′s yeast, eggs, fish, seafood, lactalbumin, nuts, whey protein
Arginine In a presence of glycine arginine is wound healing Almond, beans, carob, cashews, garlic, peas, pecans, sea food
Chromium Body building, coronary artery disease, hyperglycaemia, elevated intake of glucose or refined carbohydrates Asparagus, apples, egg yolk, mushrooms, nuts, oysters, potato, prunes, unprocessed wheat (35-45% loss in refining flour).

Dietary Plan
In lean person, a meal stimulates up to a 40% increase in diet induced thermogenesis. Overweight person stimulates just 10% and in the obese energy is stored and not converted into heat at all (Pizzorno et al. 2008). The patient′s current BMI (Basal Metabolic Index) is 31.6. To obtain a ideal BMI level of 23 the patient needs to weigh approximately 52-69kg.
BMI=Weight Kg/ (Height)2
Recommended BMI=23
23=X kg/2.7556m
Xkg=23x2.7556
Xkg=63.4kg is the recommended weight for this patient.
Protein requirement
Ideal weight x 0.9 x Exercise factor
63.4 x 0.9 x 1.2

68.9g of protein/day
According to Gropper (2005), the recommended protein requirement is 56 grams/day for a male aged 31-50. However, since he is obese he may require more protein. The amount of protein in foods varies and client need to be educated how much protein is in each meal. With his old diet the total protein intake was 20%. In contrast to the new diet has 32% protein. Protein uptake can be enhanced with a protein shake or a protein bar snack.
Carbohydrates and fiber
Excess carbohydrates are converted to fat and ideally total carbohydrates of the total diet should be 30%. He is lacking protein and essential fatty acids, thus the ration should be protein 40% and fat 30%. The ratio of the protein, fat and carbohydrates for the new diet is protein 32%, fat 37% and carbohydrates 31%. The old diet showed excess carbohydrates with 40% of carbohydrates, 40% of fat and only 20% protein like mentioned above. There was a significant drop in carbohydrate intake from 180.130 to 92.305. Fiber increased from 22.435 to 31.408. However, fiber to reach 100% intake, he needs to increase fiber for 17%. This may be done by adding a psyllium husks or slippery elm drink on a daily diet. These products were not included into Foodworks program, thus were not included into diet calculations. The old diet was high in GI and sodium. Improved new diet had 760.342 sodium, compared to the old one 2461.71.

Energy expenditure
Ratio energy from protein is 20%, whereas fat and carbohydrates are 40%. He does not drink alcohol, thus no energy is from alcohol. In the new diet the energy from protein ranges between 32-37% for the breakfast and dinner. Energy DF with new diet was 5299.063k/j; the old diet instead, had 7753.470k/j of Energy DF.
Fat Ratio
54% of the fat with the old diet was from saturated fats while with the new diet provided a lot lower saturated fat ratios in all meals was achieved; ranging from 17-37% (including breakfast, morning tea, lunch, afternoon tea and dinner). Saturated fat having medium-length chains, along with unsaturated trans fatty acids, are hypercholesterolemic, while mono and polysaturated cis fats tend to lower serum cholesterol (Gropper 2005). New diet ratios for fat were: Poly 37%, mono 40% and saturated 23%. Old diet: poly 13%, mono 34% and saturated 54%. This signifies the improvement for healthy fat ratio in the innovative diet. Fat in total with the old diet was 40%, whereas with the new one it was 37%. The amount of fat can be 40%, as long as it comes in easily digestible sources and forms. Saturated fat in grams reduced from 41.01g to 9.968g with the new diet.
The following foods are essential in this clients diet:

- Onions, garlic, ginger and turmeric
- High fibre
- Nuts, seeds
- Slippery elm, Aloe vera juice
- Lean meat such as kangaroo
- Dark green leafy vegetables (bok choy, rocket, kale)
- Oily fish (mackerel, salmon)
- Brown rice
- Maintain hydration 2-3 litres/day
- Eat 5-6 small meals a day
- Always eat the protein portion of the meal first and have protein in each meal

Recommended diet
Meal Time Meal contents
Breakfast 7am Sardines, spinach, mushroom, tomato,onion, ryebread
Morning Tea 10.30 Boiled egg and apple
Lunch 1pm Borsch Soup: beetroot, red cabbage, carrot, onion, celery, water, garlic, black pepper, kangaroo meat
Afternoon tea 3pm Bornhoffen yogurt, berries, LSA mix, psyllium husks
Dinner 6pm Salmon cooked in olive oil and garlic, Kippfler potato mash with lime juice, served on the bed of rocket, lemonjuice, pinenuts, snowpeas, cucumber, red capsicum, white peppar, cherry tomatoes and fresh basil leaves.
Fluids Water (2.5l), 1 cup of green tea, 1 cup of rooibos tea
Total Daily Calorie Value (Foodworks 2009)

Dietary calculator (Shoring 2009) shows this patient needs total of 4120.20 Kcal per/day to maintain homeostasis. The new diet sustain 2454.407 Kcal reduction that be supposed to weight loss, thus help in the treatment of this client. His Total Energy Requirement indicated in Dietary Calculator (see appendix),

is 2608.2. His Protein Intake requirement is 1.4 with his level of Exercise Factor (recommended range 1.1-1.5). This is 26.46 gm per meal (Dietary Calculator 2009) According to Dietary Calculator (2009) his fat intake per meal should be 31.20 gm. Recommended carbohydrate intake is 111.28/per meal. However, this amount of carbohydrates can be debatable in obese people.
Previous macronutrient percentages and breakdown of fat are shown in Food Record 2, pg. 6. At present the diet is high in saturated fat (54%) and refined, processed carbohydrates (40%) that are acidifying the body (see appendix Food Record 2 pg. 6). Seaman (2002) supposed that people literally eat themselves into inflamed state by consuming pro-inflammatory foods. He needs to reduce grains and increase fruit and vegetables (Frassetto 2006). Low nutritional value in combination with high saturated fat is contributing to the patient's condition. He needs to increase anti-inflammatory fat such as omega 6. He will benefit from high protein diet that will prevent muscle wasting and fatigue also. Uptake of amino acids by the skeletal muscles readily occurs following protein-containing meal (Gropper 2005).
White fat cells aggravate blood sugar imbalance and promote atheroscelerosis (Pizzorno et al. 2008). Brown fat instead helps to increase capacity to metabolize fats (Pizzorno et al. 2008). Obese person have less brown fat, thus energy is stored instead of turned into heat. Thermogenesis needs to be increased by enhancing insulin sensitivity. This can be done by controlling hyperglycemia with chromium based foods (see Nutritional Requirements, pg 15). Chromium is a component of Glucose Tolerance Factor (GTF) and aids glucose metabolism. Approximately 56% of the population is at risk of being Chromium deficient (Osiecki 2007). Chromium also may reduce total cholesterol, triglycerides and high density lipoprotein. Supplementation of chromium lower white fat in the body and increase lean body mass by increasing insulin sensitivity (Pizzorno et al. 2008).

Conclusion

This treatment protocol is designed to ease of the patient's pain, enhance immune system, reduce inflammation and simultaneously reduce the emotional symptoms. Nutritional deficiencies can deplete energy levels thus contributing to pain tolerance factors. Antioxidant mechanisms in the body act synergistically as the best line of defense against free radical attack (ARL 2009). The body possesses a number of mechanisms to control the production of reactive oxygen species and to limit or repair the damage to tissues. By changing the diet the regulation of neurotransmitters is also enhanced, thus normal sleep pattern is restored also. It would be beneficial for the patient to reduce medication that may contribute to gastro intestinal symptoms. The implementation of the nutritious diet may help to reduce stress like symptoms and improve his overall health. Compliancy of the client is important and the results will be quicker if he is able to adapt to the changes. The client needs to be educated how to prepare food (excess oils, nutrient losses) and adulteration of the diet. Intake and also the portion sizes are important as well as how the food is absorbed individually. Energy usage must be calculated into ones diet. It is wise to consider organic food, since the level of phytochemicals and isoflavones varies according to how the food is grown. Dietary mod ification and nutritional supplementation appear to be the only treatments that can tackle the underlying cause, which is diet-induced pro-inflammatory state.

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