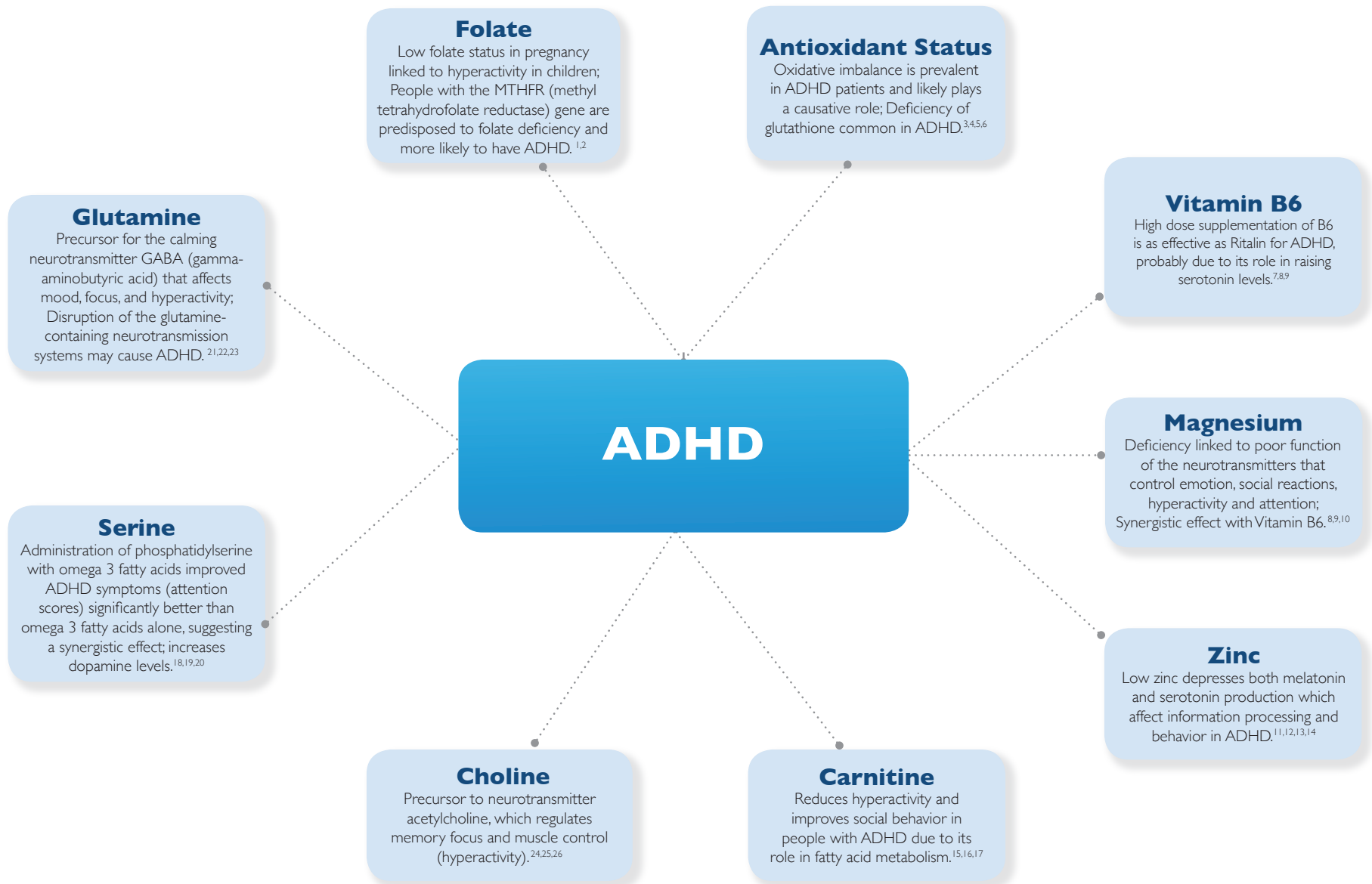




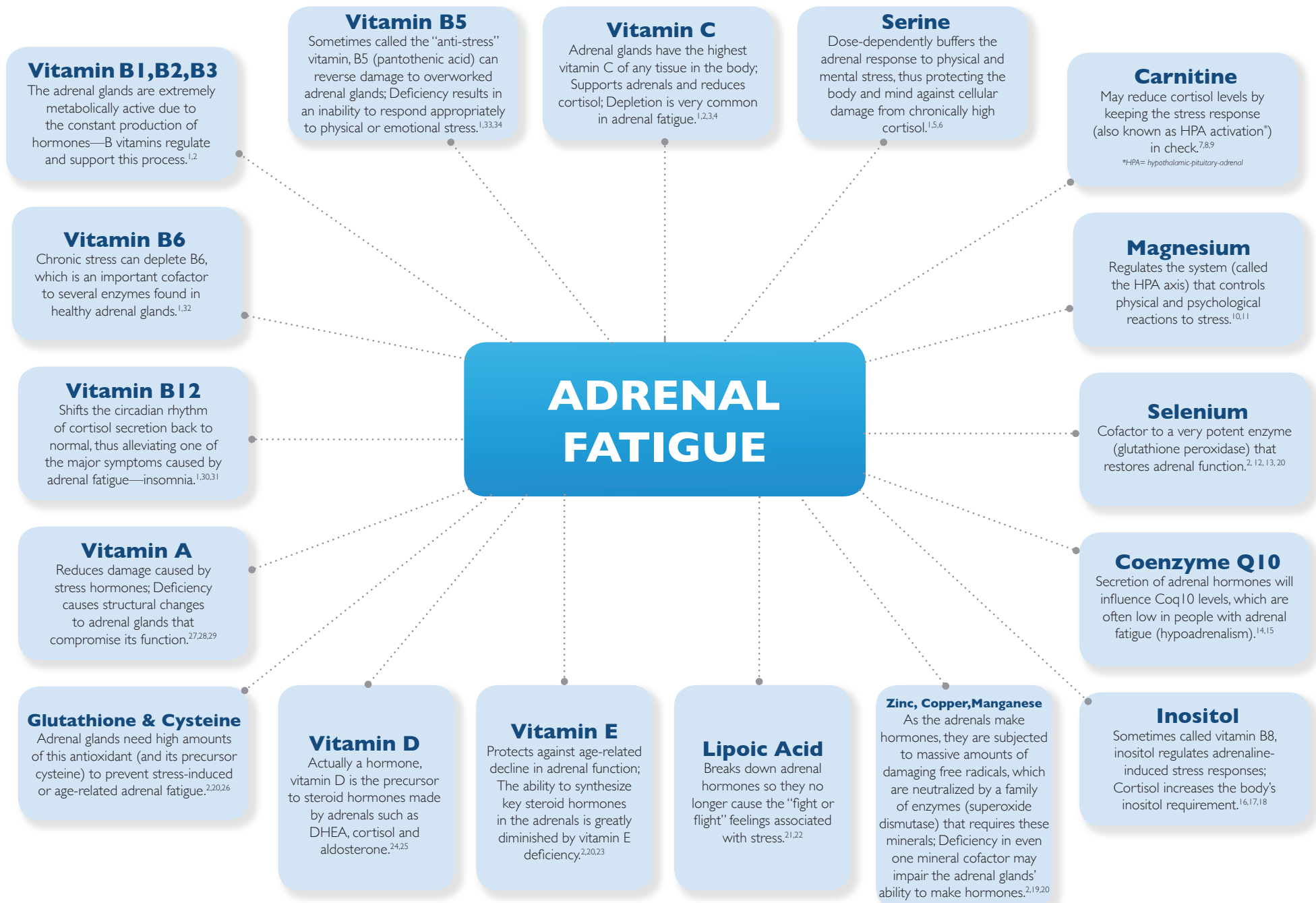
Nutrient Correlations

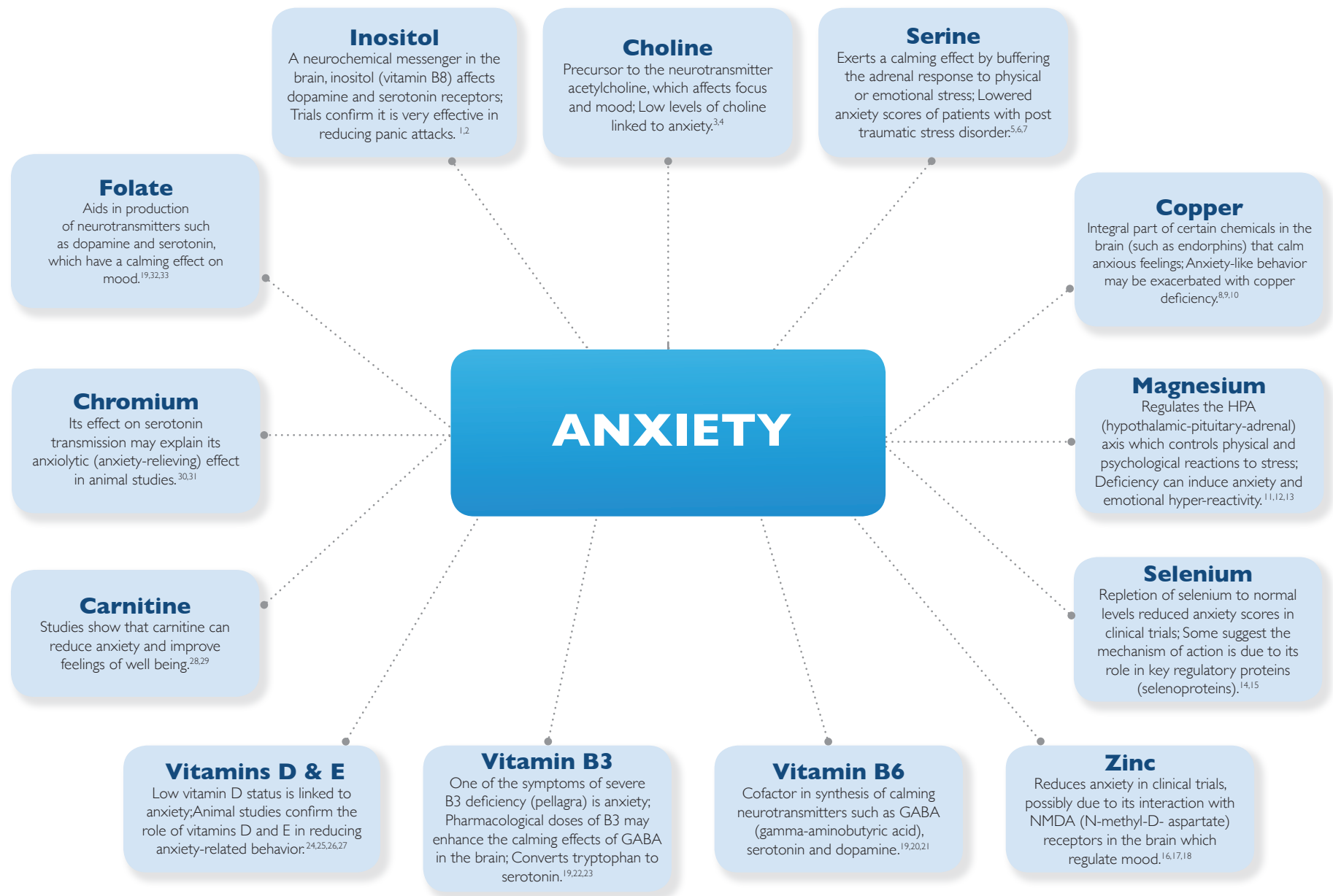
Deficiencies Correlated
with Disease Conditions





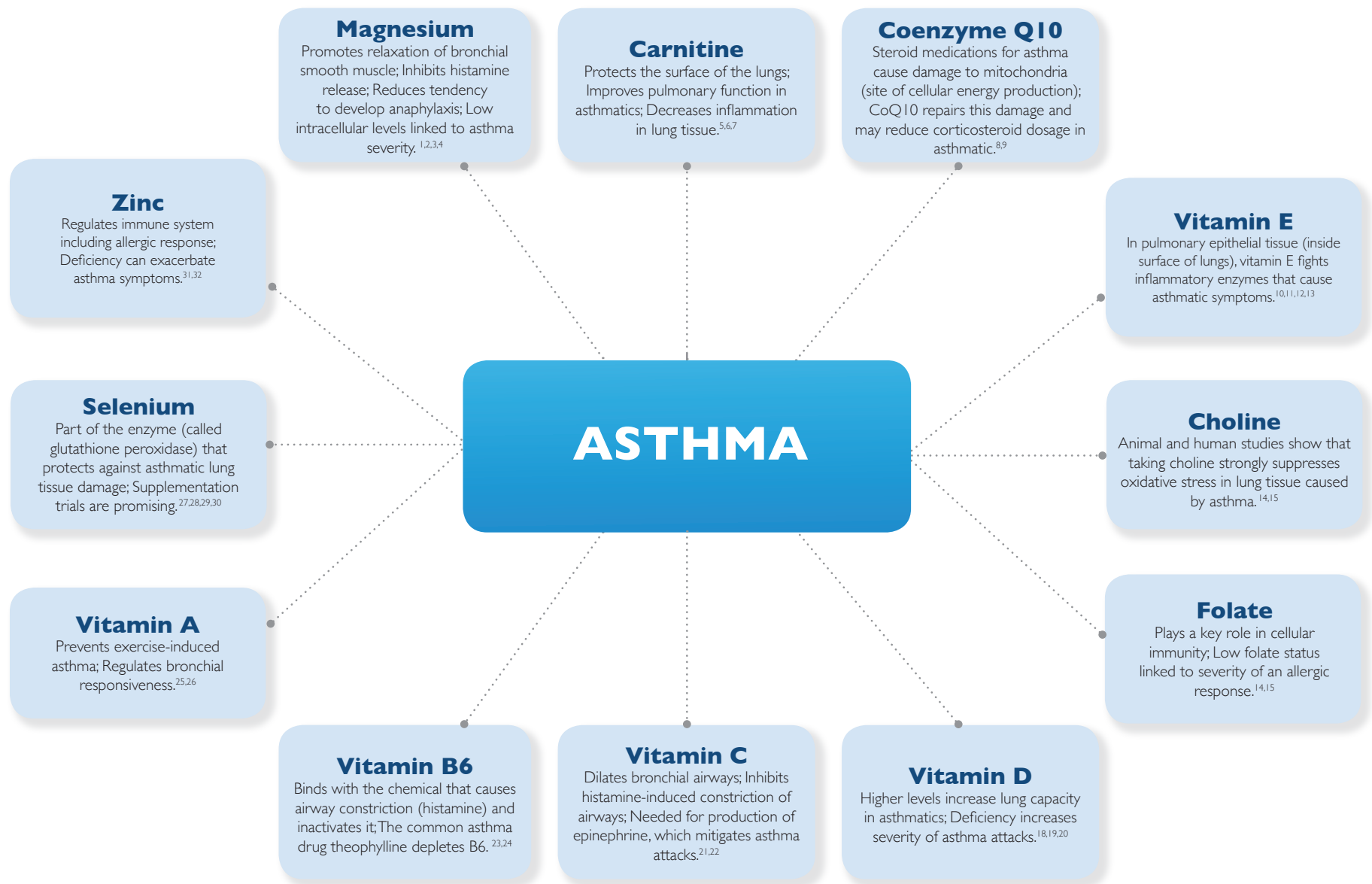
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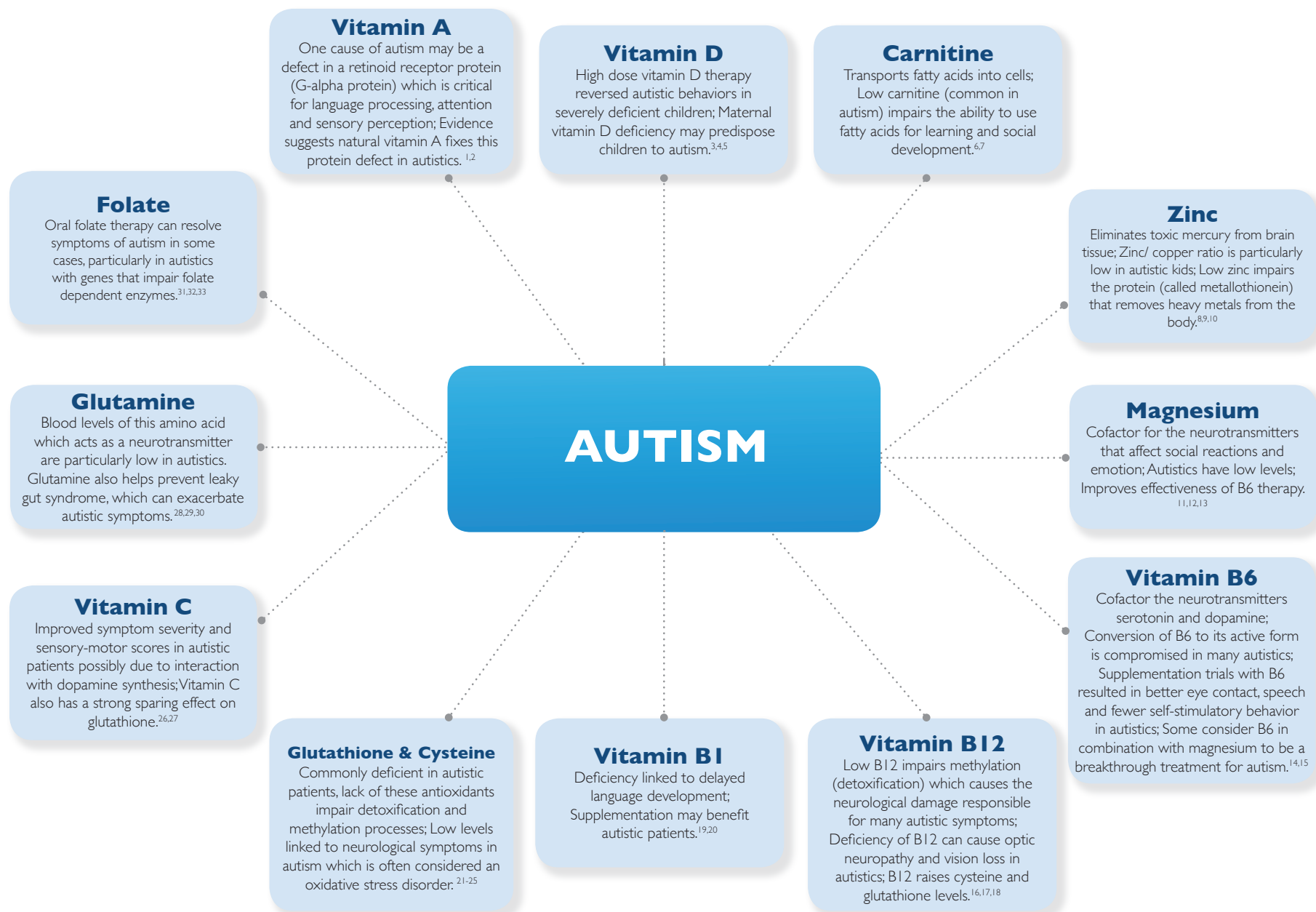


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DEPRESSION

Magnesium

Deficiency damages NMDA (N-methyl-D-aspartate) receptors in the brain, which regulates mood; Well-documented anti-depressant effects.^{1,2,3,4}

Selenium

Integral part of regulatory proteins (selenoproteins) in the brain; Supplementation trials are promising; May alleviate postpartum depression.^{5,6}

Folate

Building block for many “feel-good” neurotransmitters such as serotonin, dopamine and norepinephrine; Low folate causes poor response to antidepressant meds; The lower the folate, the more severe the depression.^{7,8,9,10}

Vitamin B12

Depression may be a manifestation of B12 deficiency; Repletion of B12 to adequate levels can improve treatment response; B12 deficiency common in psychiatric disorders.^{11,12,13}

Chromium

Elevates serotonin (feel-good neurotransmitter) levels in the brain; May be particularly effective on eating symptoms of depression such as carbohydrate craving and increased appetite, due to its effect on blood sugar regulation.^{37,38,39}

Zinc

Improves efficacy of antidepressant drugs; Particularly useful for treatment resistant patients; Regulates neurotransmitters.^{33,34,35,36}

Serine

Regulates brain chemistry; Involved in NMDA receptor function; Acts as a neurotransmitter; Low levels correlate with severity of depression.^{31,32}

Antioxidants

Oxidative stress in the brain alters neurotransmitter function; Antioxidants protect our brain, which is very sensitive to oxidation; Several antioxidants—Vitamins A, C, and E, Lipoic Acid, CoQ10, Glutathione, and Cysteine—play a key role in prevention and treatment of depression.^{28,29,30}

Biotin

Part of the B-vitamin complex, biotin deficiency has induced depression in animal and human studies.^{26,27}

Inositol

Influences signaling pathways in the brain; Particularly effective in SSRI (selective serotonin reuptake inhibitor) sensitive disorders.^{24,25}

Carnitine

Increases serotonin and noradrenaline which lifts mood; In trials, carnitine alleviates depression with few, if any, side effects.^{22,23}

Vitamin B6

Cofactor for serotonin and dopamine production (feel good chemicals); Studies indicate that low levels may predispose people to depression.^{14,15,16}

Vitamin B2

Low B2 has been implicated in depression due to its role in methylation reactions in the brain.^{17,18}

Vitamin D

Clinical trials suggest increasing blood levels of vitamin D, which is actually a hormone precursor, may improve symptoms of depression.^{19,20,21}

DIABETES

Biotin

Stimulates glucose-induced insulin secretion in pancreatic B-cells; High dose biotin can improve glycemic control in diabetics.^{33,34,35}

Chromium

Helps insulin attach to cell's receptors increasing glucose uptake into cell; Deficiency can cause insulin resistance; Supplementation trials show dose-dependent benefits for type II diabetics.^{36,37,38}

Vitamin B12

Deficiency common in diabetics because metformin depletes B12.^{1,2}

Vitamin B3

Preserves B-cell function in type I diabetics; Part of GTF (glucose tolerance factor) which facilitates insulin binding.^{3,4,5}

Vitamin D

Lowers risk of type I and II diabetes; Suppresses inflammation of pancreatic B-cells; Vitamin D receptor gene linked to diabetes.^{6,7,8}

Vitamin E

Confers protection against diabetes by protecting pancreatic B-cells from oxidative stress-induced damage; May prevent progression of type I diabetes.^{6,9}

Vitamin C

Lowers glycosylated hemoglobin (HbA1c) and fasting and post-meal glucose levels and in type 2 diabetics.^{10,11,12}

Inositol

Evidence suggests that inositol may be effective in treating diabetic neuropathy.^{13,14}

Carnitine

Reduces and even prevents pain from diabetic neuropathy; Improves insulin sensitivity by increasing glucose uptake and storage.^{15,16,17,18}

Glutamine

Stimulates a hormone called GLP-1 (glucagon-like peptide I) that regulates insulin secretion after meals; Improves insulin signaling and sensitivity.^{19,20}

Coenzyme Q10

Protects kidney from diabetes-related damage; Improves glycemic control in type 2 diabetics.^{21,22}

Glutathione & Cysteine

Glutathione-containing enzymes protect B-cells which are particularly sensitive to oxidative stress; Type 2 diabetics have abnormal antioxidant status; Supplementation with the glutathione precursor cysteine restores antioxidant status.^{23,24,25}

Lipoic Acid

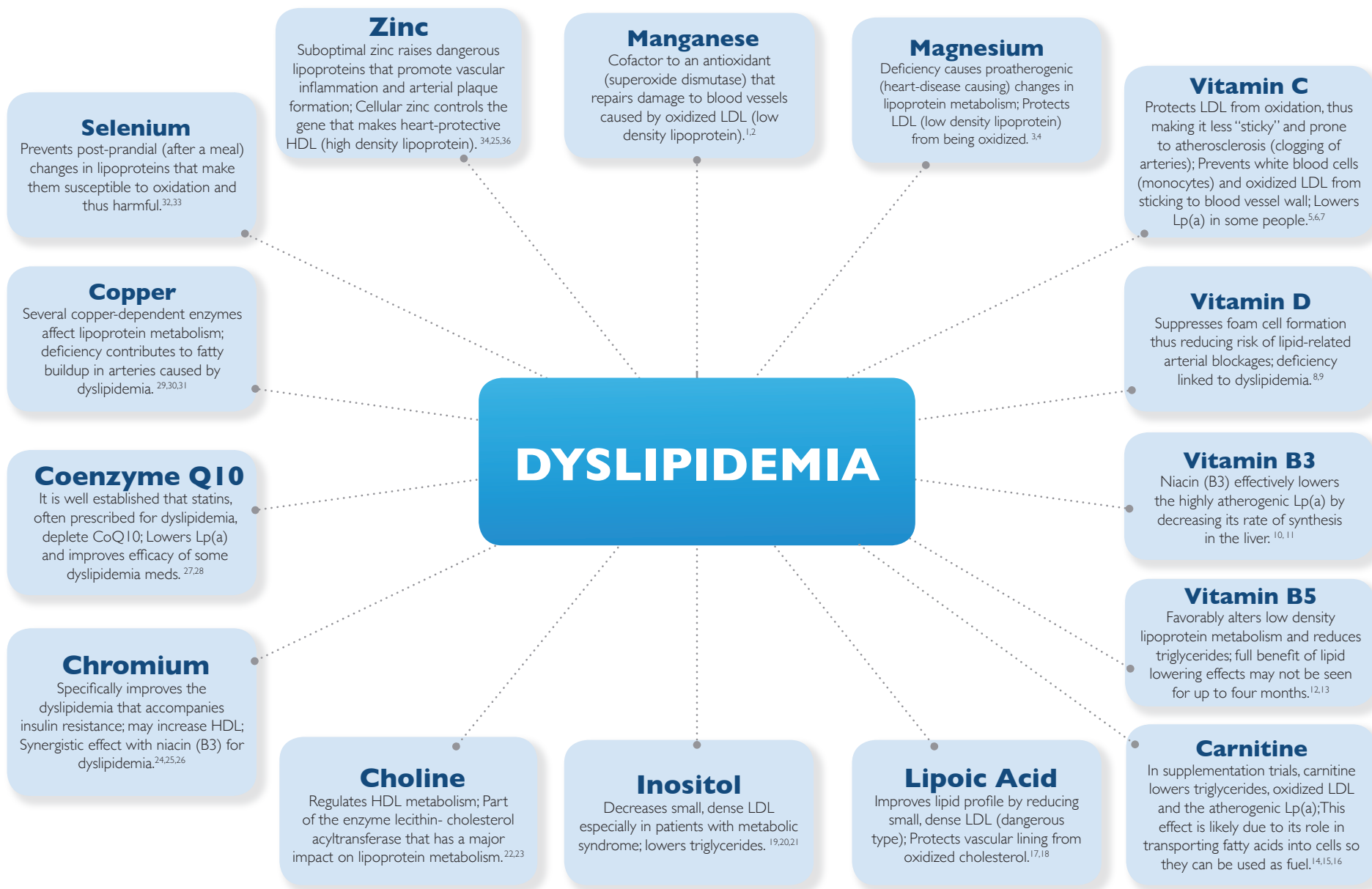
Enhances glucose uptake in skeletal muscle tissue; Improves glucose tolerance in type 2 diabetics; Very effective treatment for diabetic neuropathy.^{26,27,28}

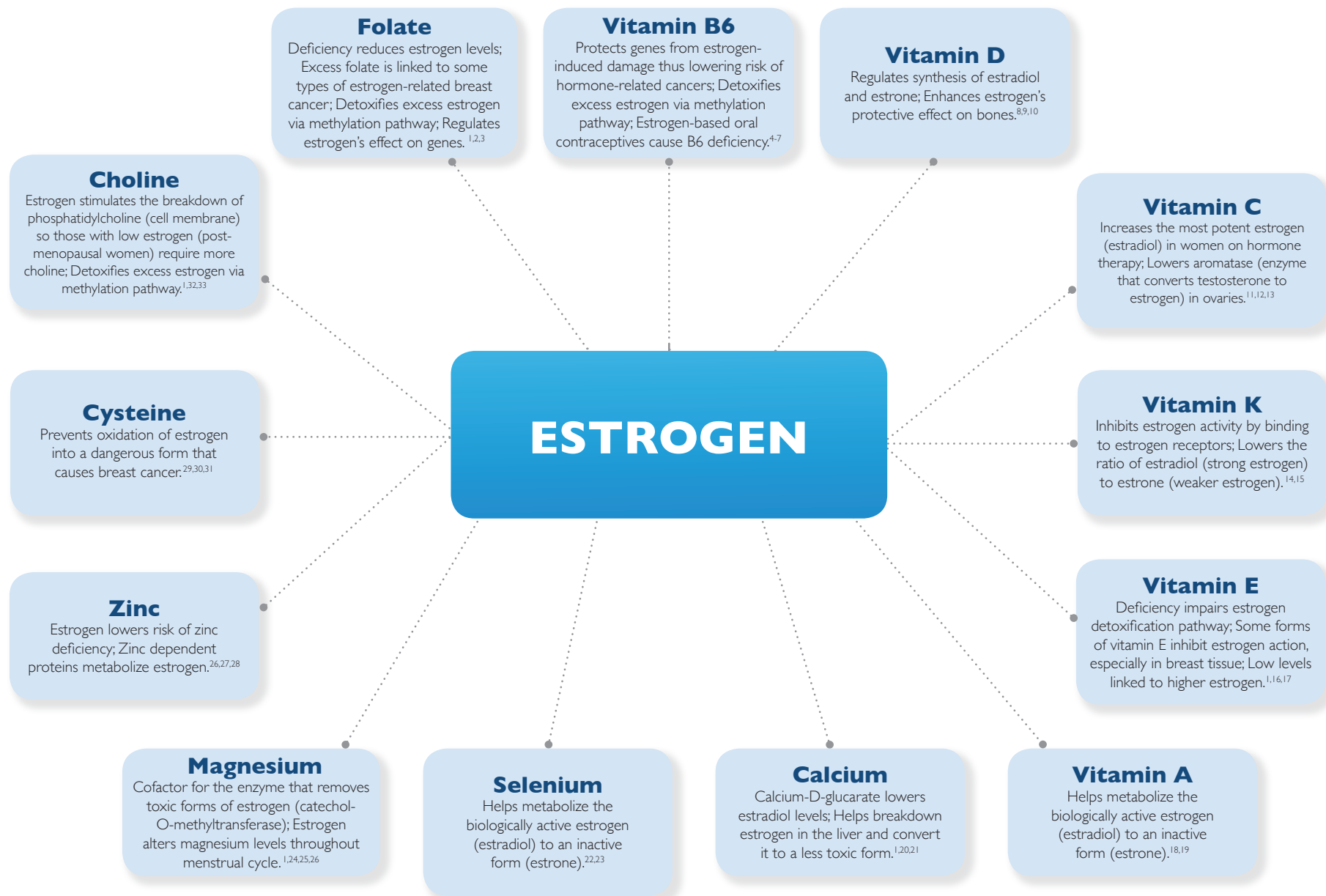
Zinc

Needed in the synthesis, storage and secretion of insulin; Protects pancreatic B-cells from damage; Affects the expression of genes linked to diabetes.^{29,30}

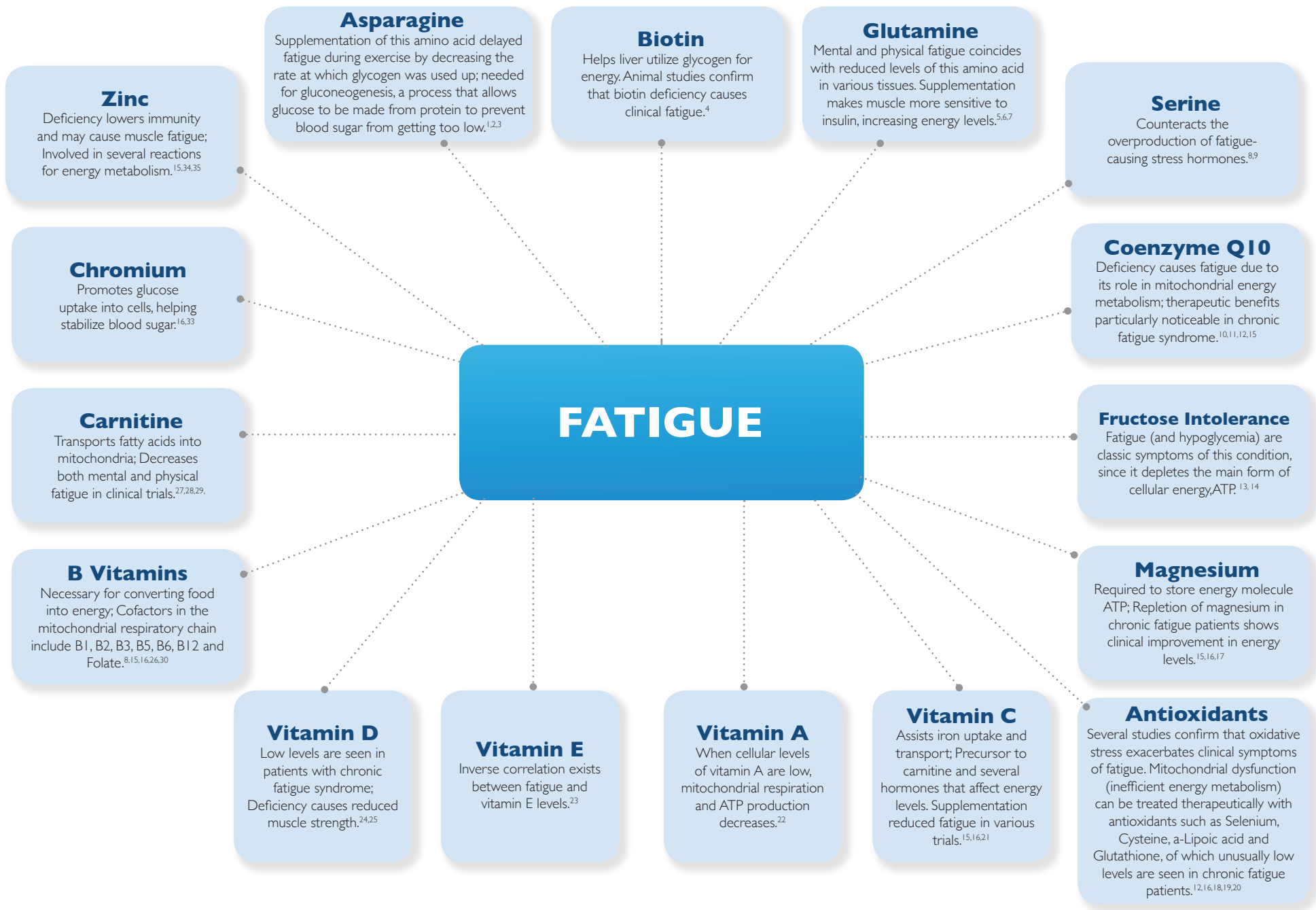
Magnesium

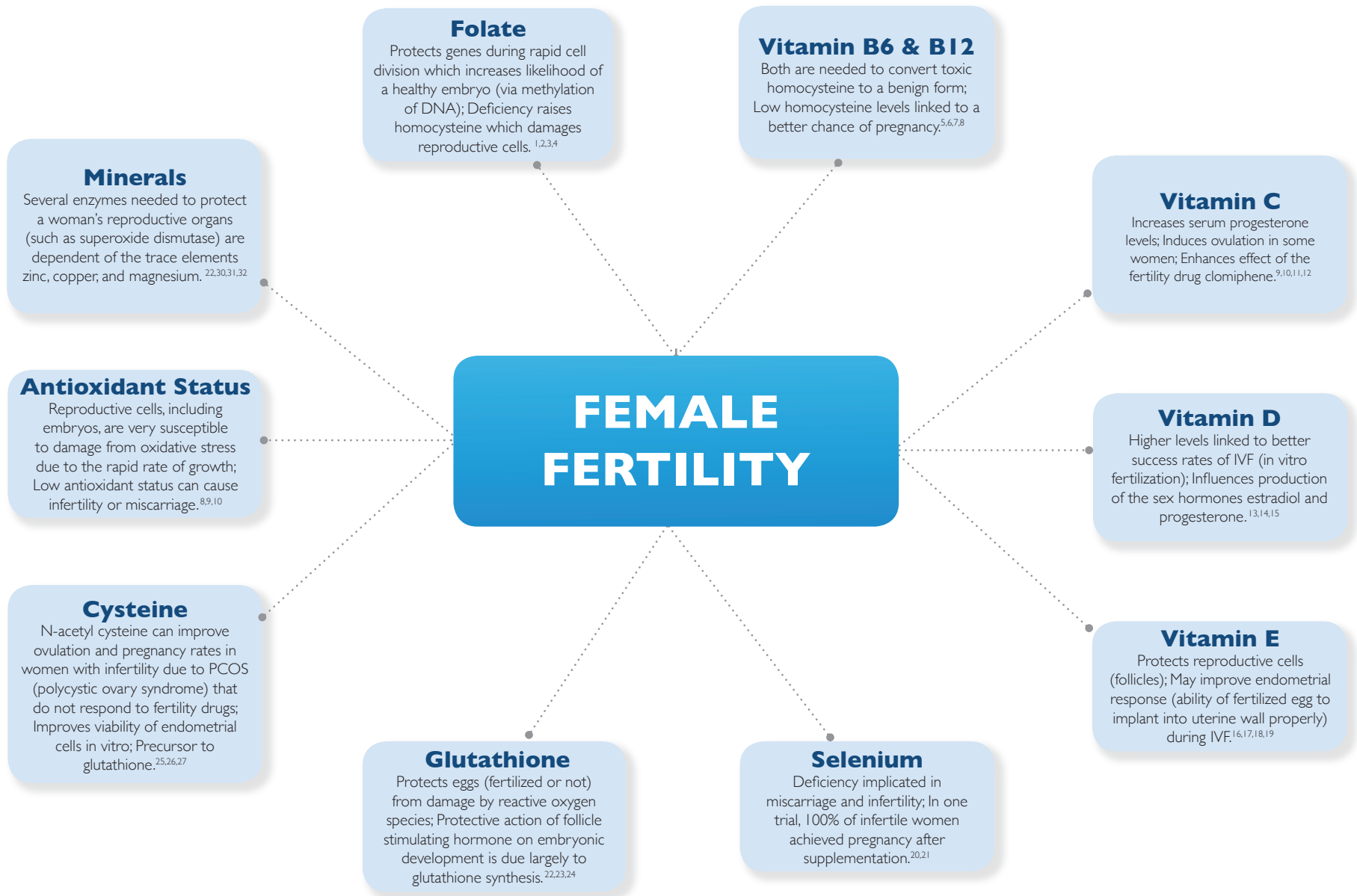
Deficiency reduces insulin sensitivity; Low magnesium exacerbates foot ulcers in diabetics.^{31,32}





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FIBROMYALGIA

Coenzyme Q10

Clinical trials consistently show that CoQ10 reduces fibromyalgia symptoms such as pain and fatigue.^{1,2,3,4}

Carnitine

Deficiency causes muscle pain due to inefficient cellular energy metabolism (mitochondrial myopathy) which presents as fibromyalgia.^{4,5}

Selenium

Deficiency is linked to fibromyalgia; In one trial, symptoms improved 95% of patients supplemented with selenium for at least 4 weeks.^{25,26,27}

Choline & Inositol

Altered levels of both nutrients seen in fibromyalgia; Choline & inositol are involved in pain perception.^{6,7,8,9}

Magnesium

Involved in pain perception pathways and muscle contraction; Treatment with magnesium can improve tenderness and pain.^{23,24,25}

Serine

Blood levels of this amino acid are much lower in fibromyalgia patients.^{10,11}

Zinc

Blood levels of zinc are associated with a number of tender points in fibromyalgic patients.²²

Vitamin D

Low levels impair neuromuscular function and cause muscle pain; Deficiency is common in fibromyalgia patients.^{12,13,14,15,16}

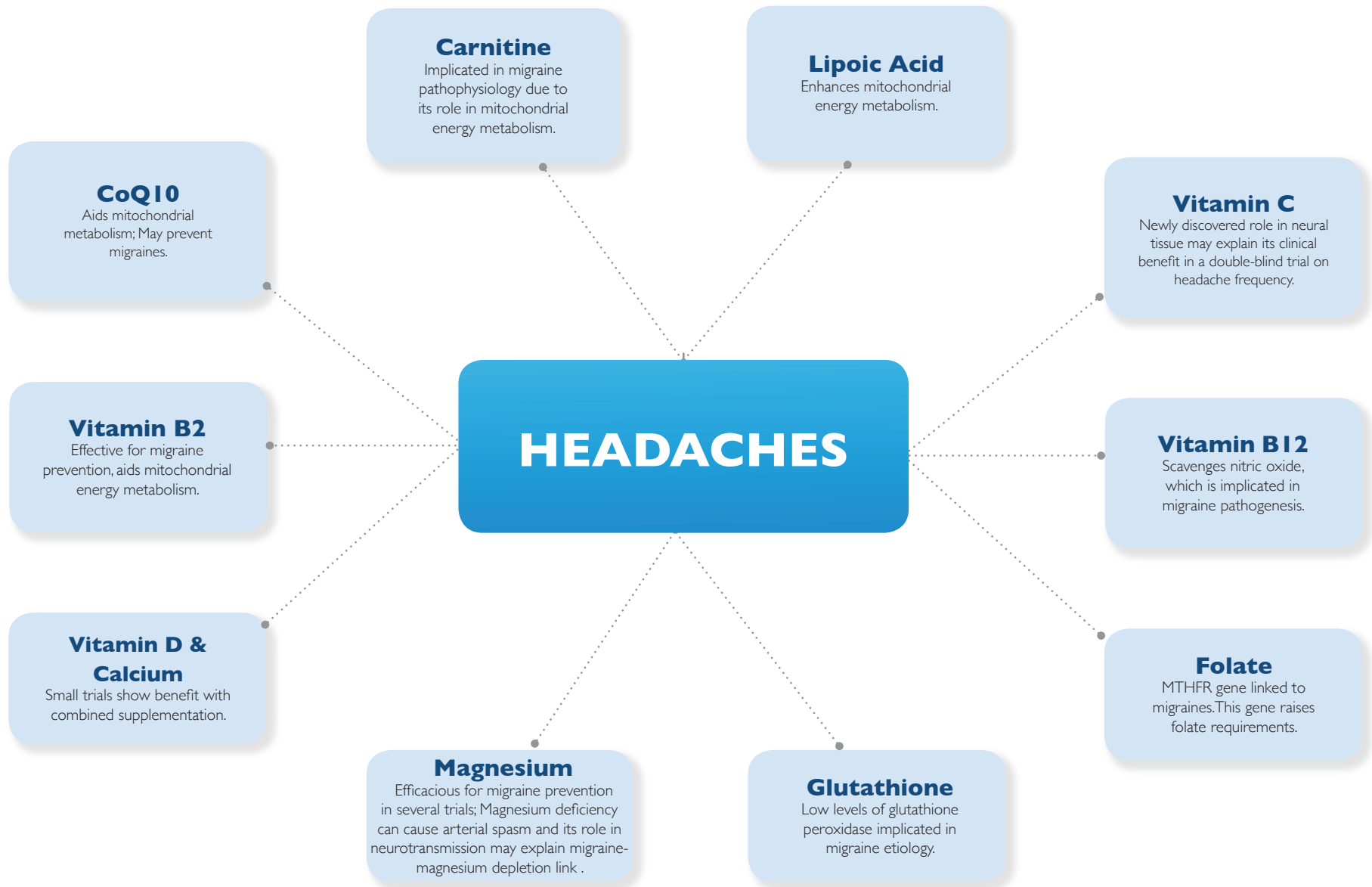
Antioxidants

Low antioxidants status increases pain in fibromyalgia, which is often considered an oxidative stress disorder.^{19,20,21}

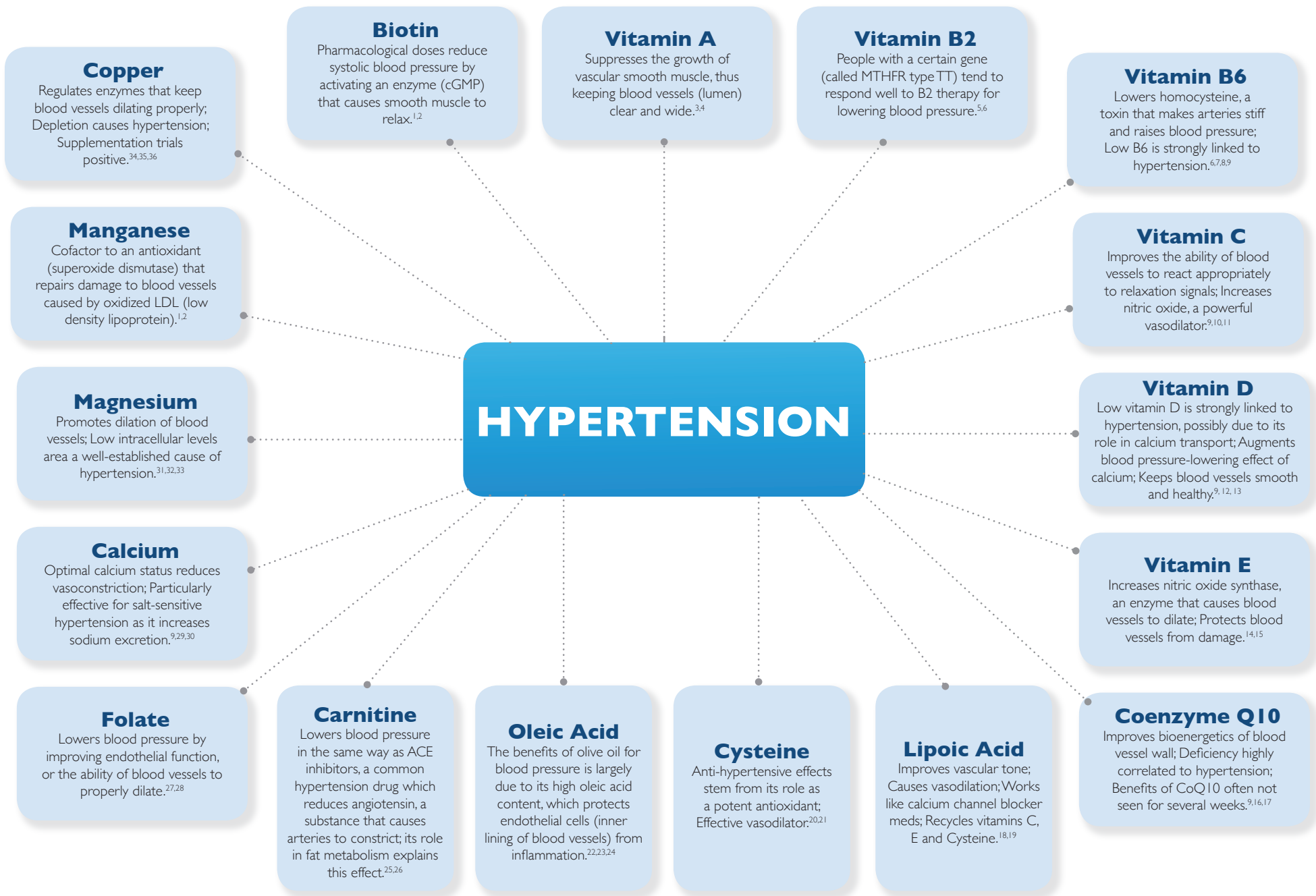
Vitamin B1

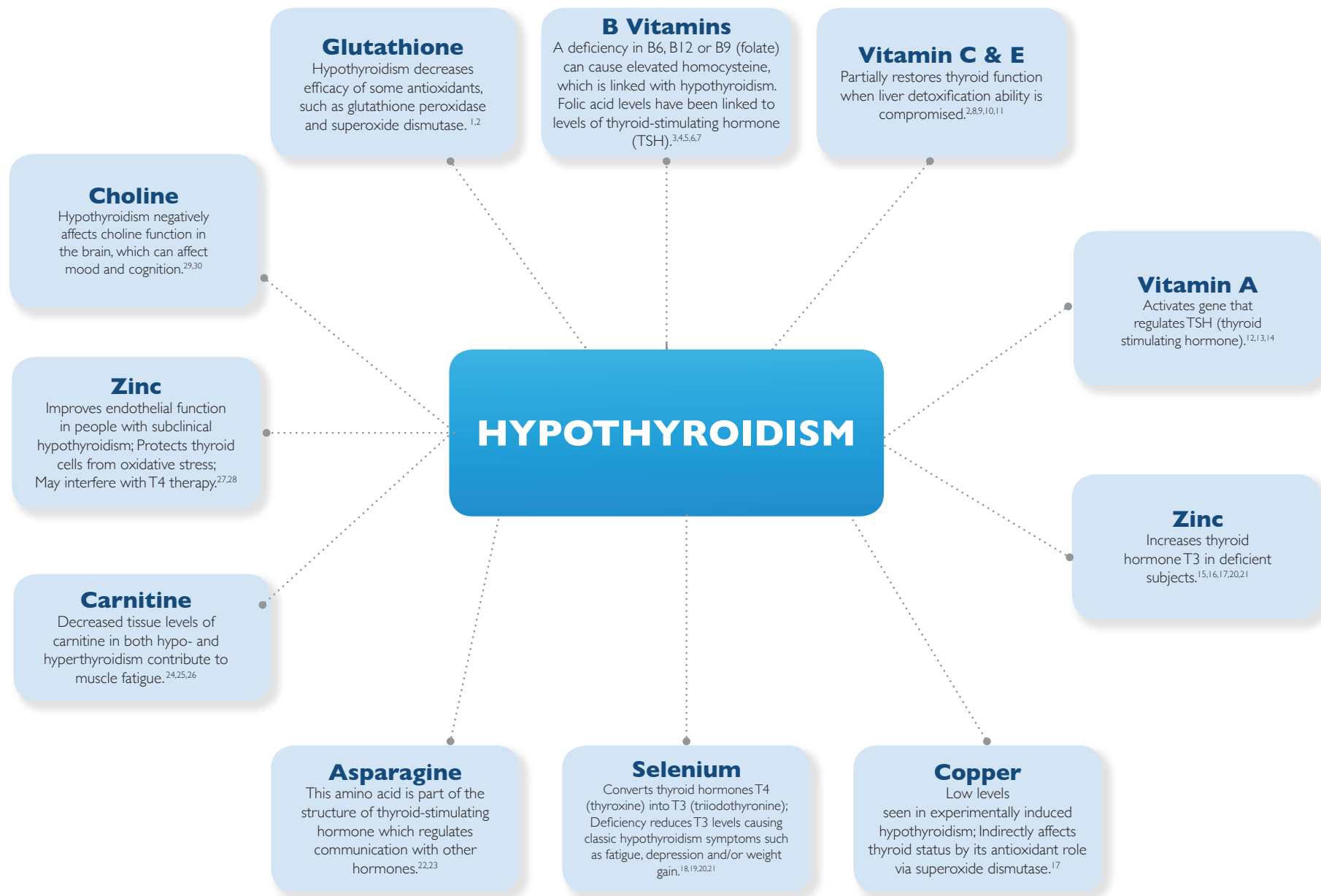
Thiamin (B1) deficiency mimics fibromyalgia symptoms including serotonin depletion (decreased pain threshold), a decrease in repair enzymes (muscle soreness) and poor energy production (muscle fatigue).^{17,18}





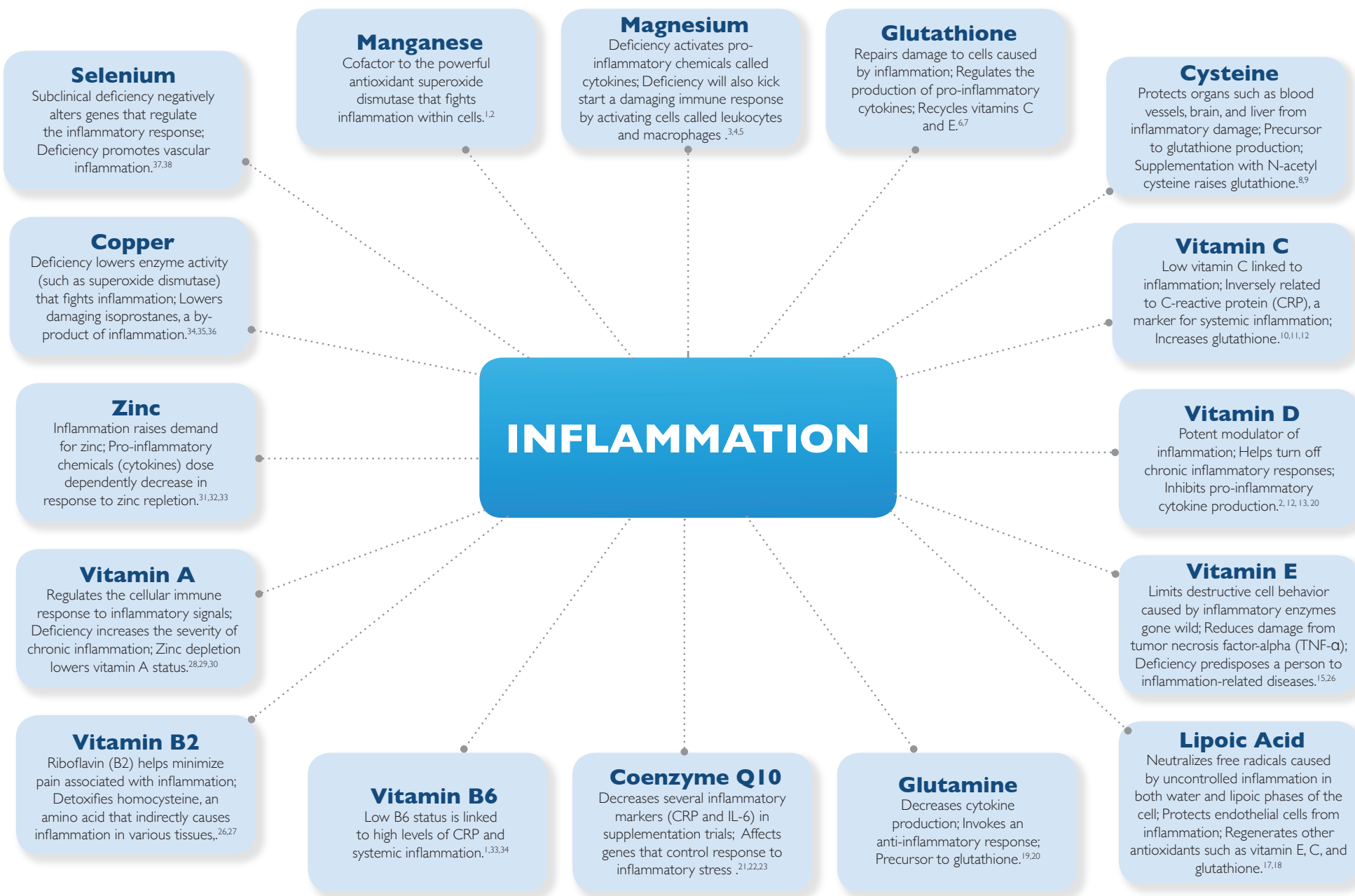
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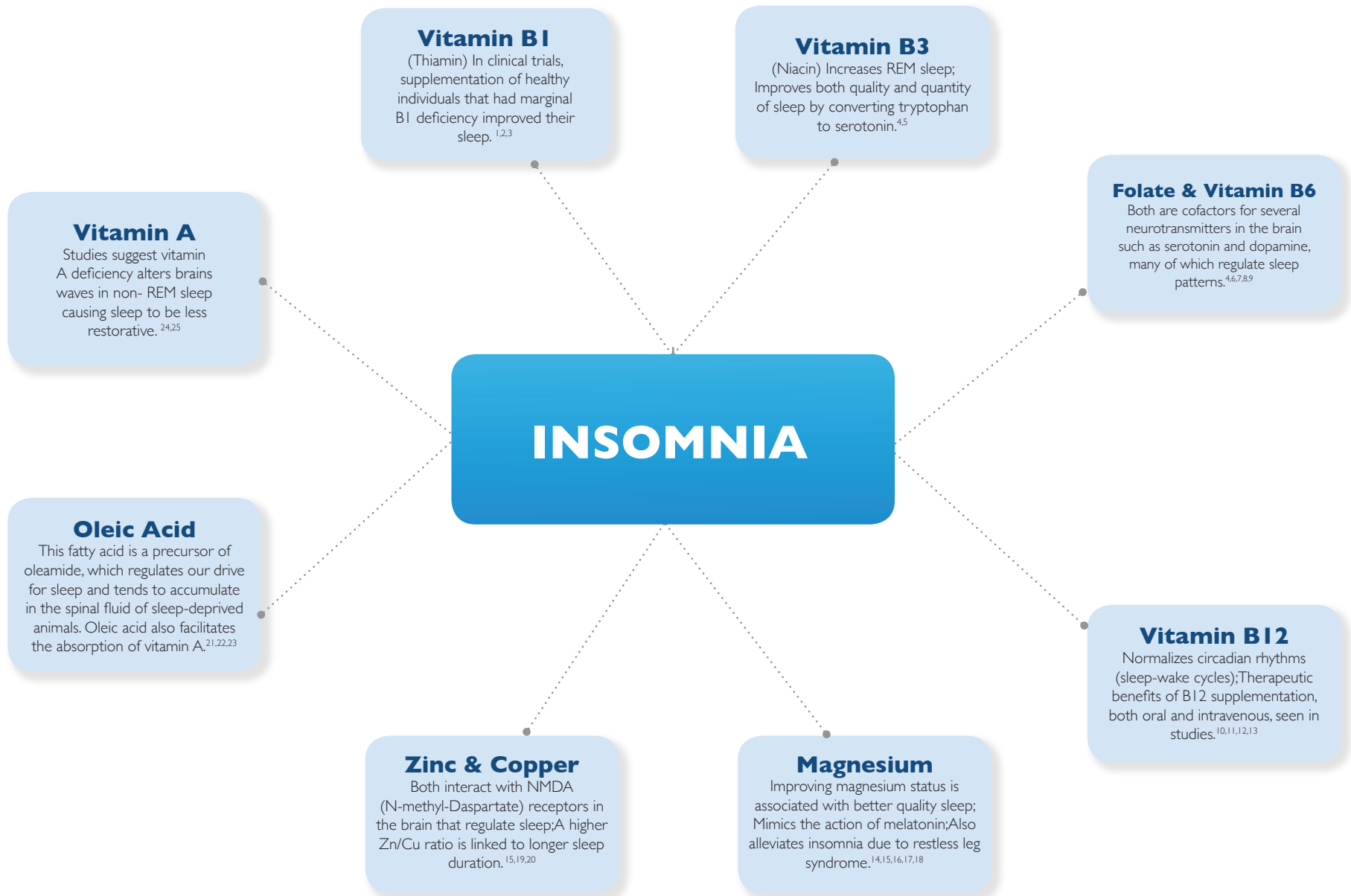




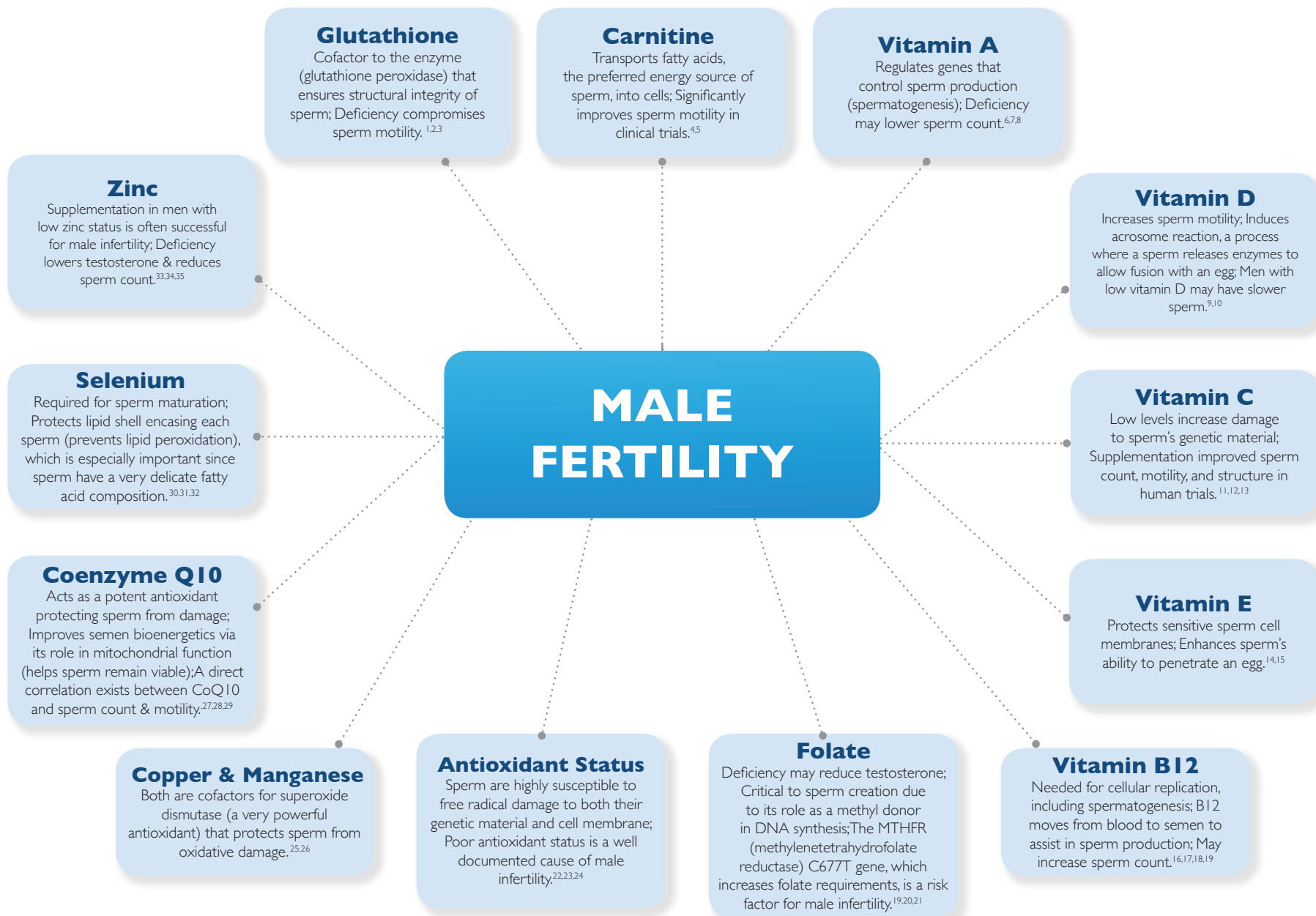
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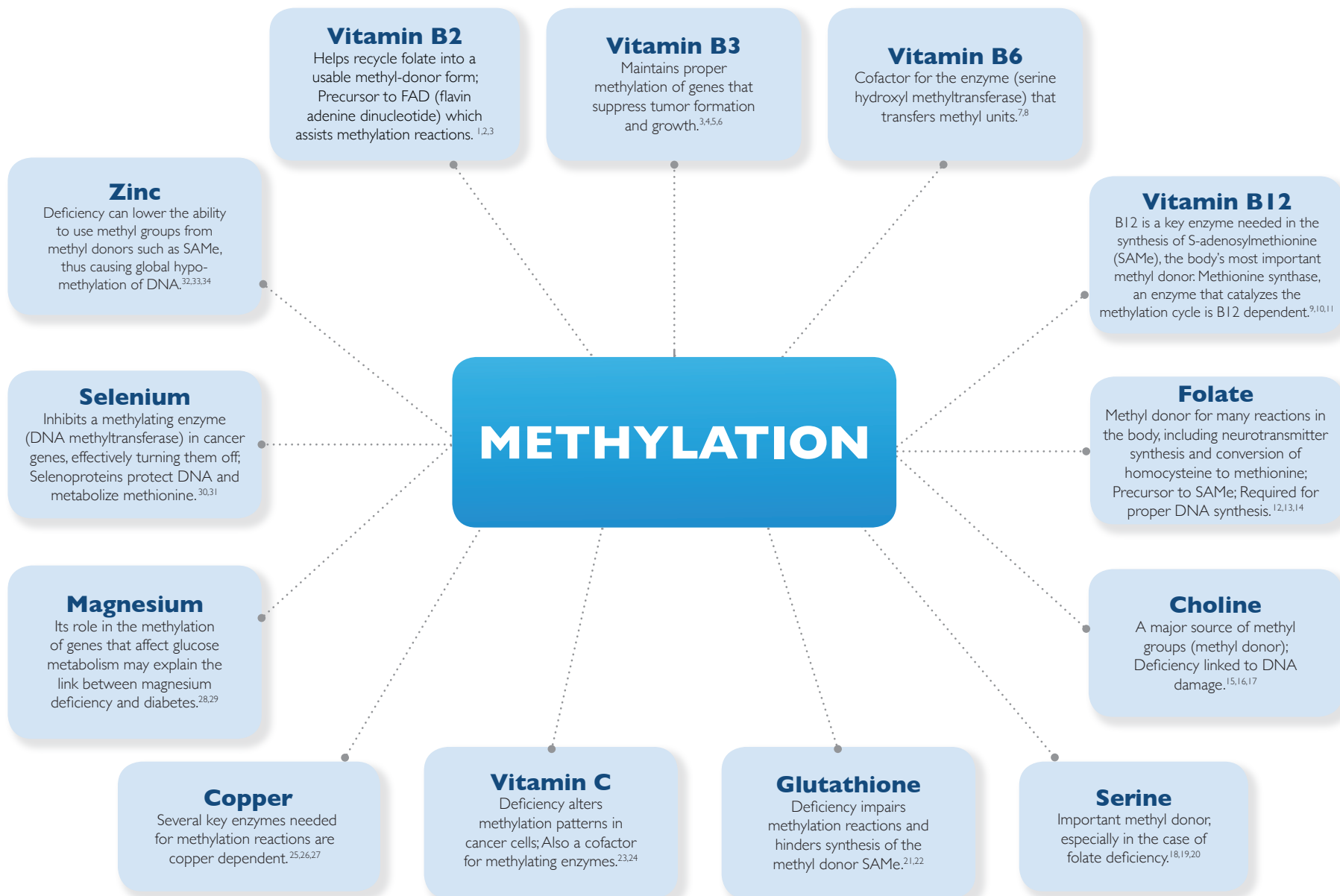


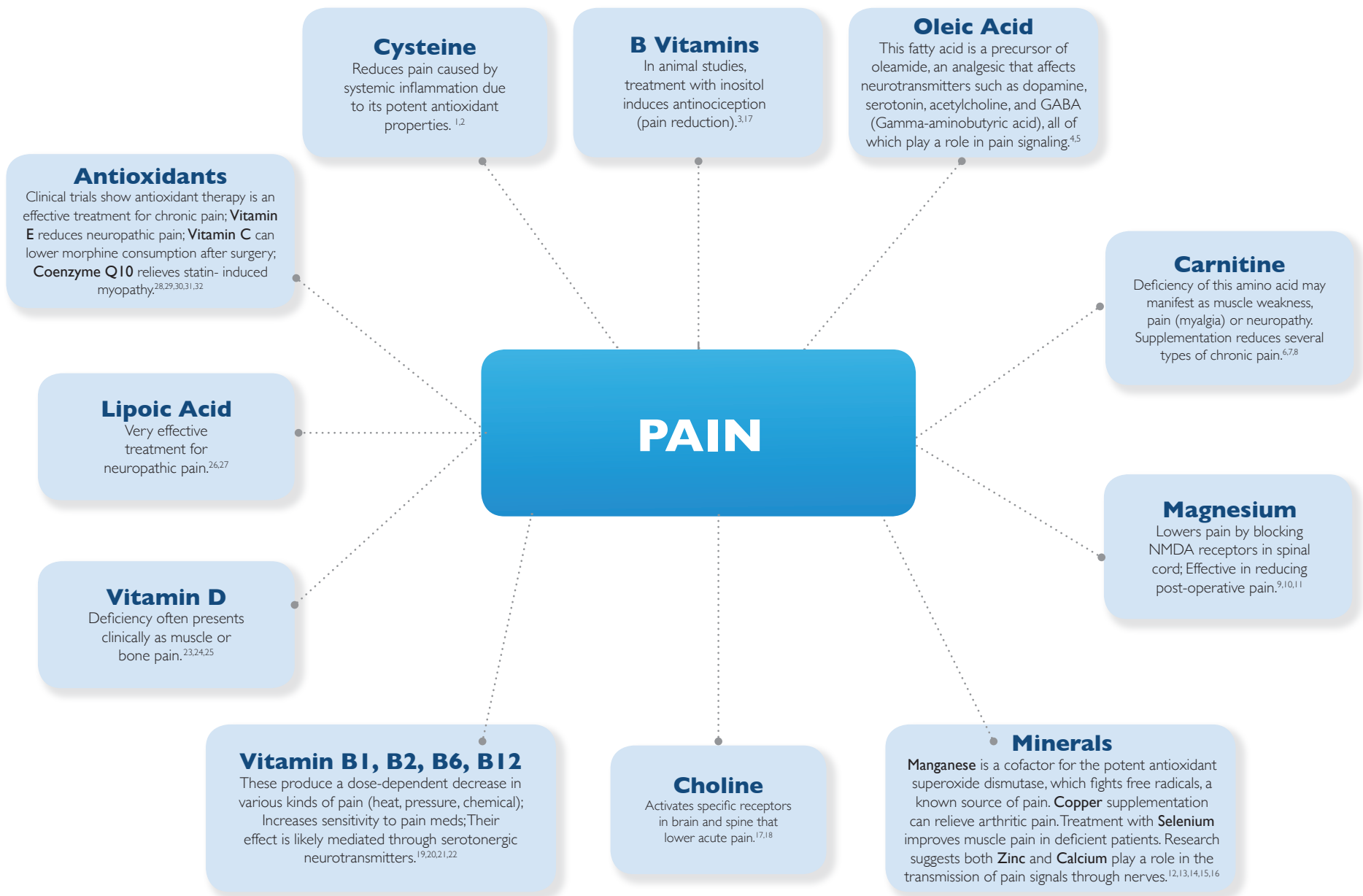


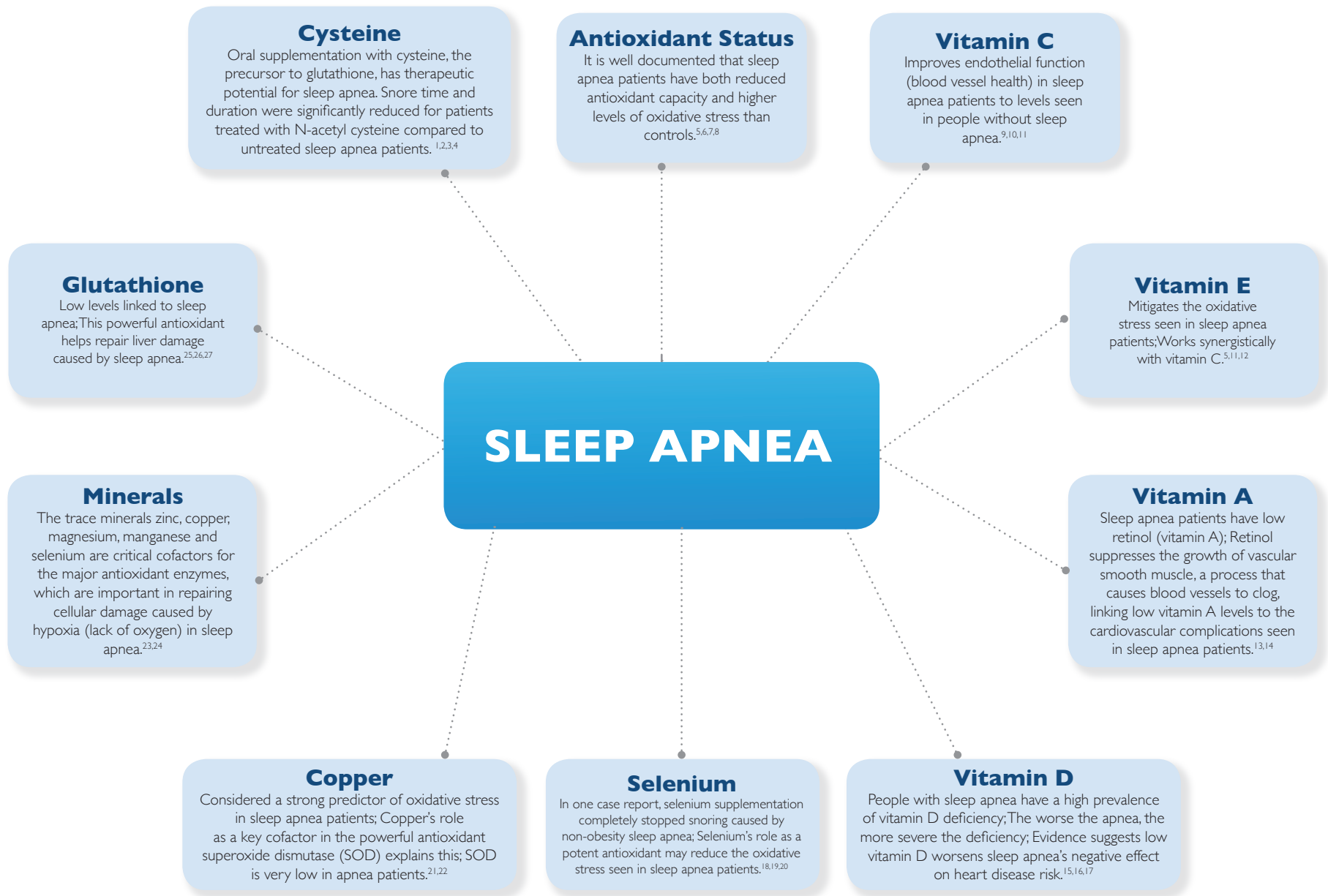
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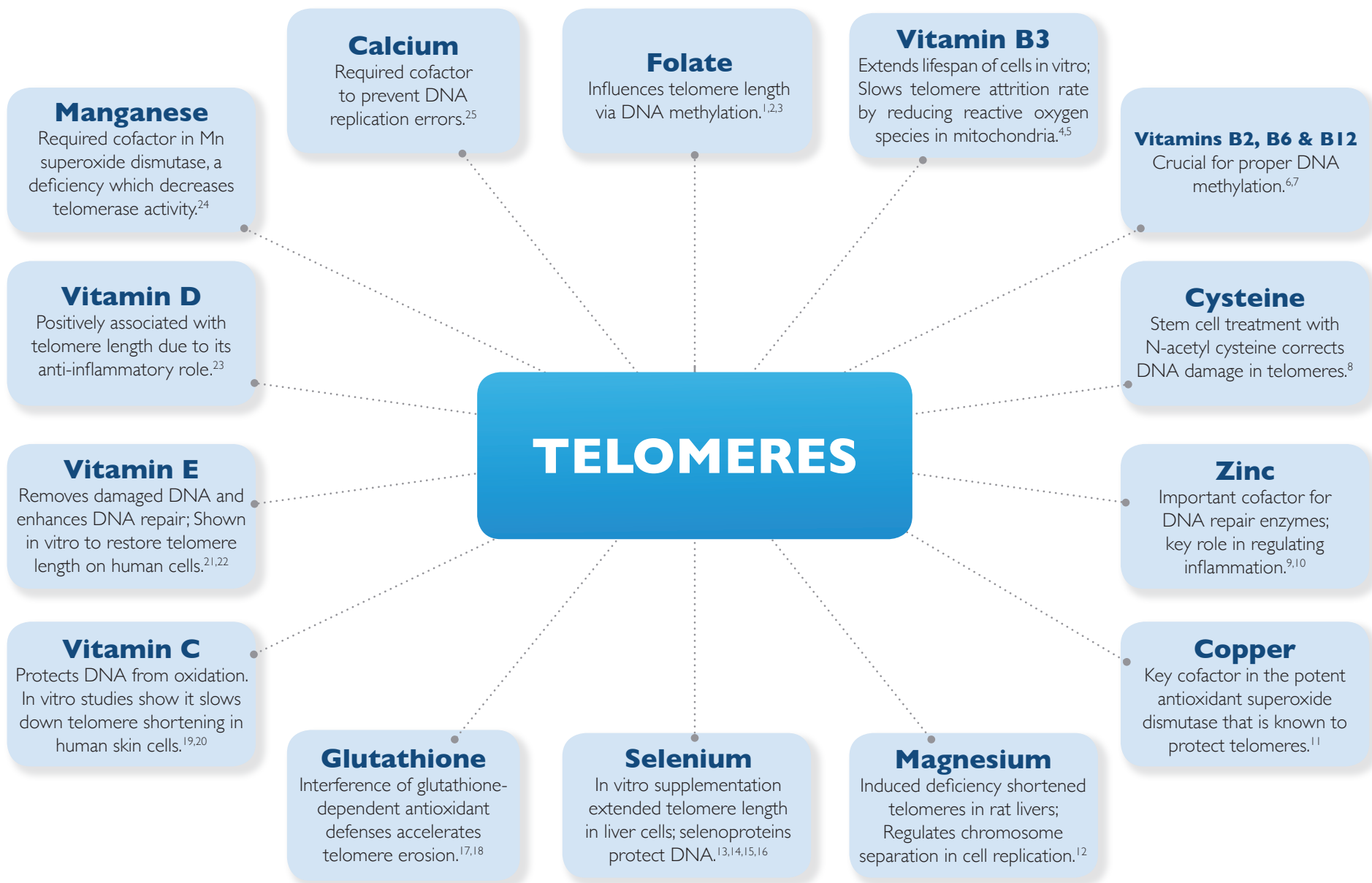


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SPORTS NUTRITION

Carnitine

Allows cells to use fatty acids as an efficient non-glycogen source of fuel; Improves muscle recovery; Offsets the rise in creatine kinase, an indicator of muscle damage.^{35, 36}

Glutamine

Its depletion compromises immunity in many athletes after intense physical training; supplementation by marathoners reduced post-race infections.^{1,2,3,4}

Coenzyme Q10

Mitigates muscle damage after high intensity training; Trials indicate CoQ10 benefits both strength and endurance; 300 mg of CoQ10 increased power in Olympic athletes.^{5,6,7}

Lipoic Acid

This powerful antioxidant reduces cellular damage due to intense physical exercise; Recycles other antioxidants such as glutathione.^{8,9}

Glutathione

Powerful antioxidant; Detoxifies cellular by-products after workouts; Reduced blood levels of glutathione are counterproductive to an athlete in training.^{10,11}

Cysteine

Reduces time to fatigue in endurance sports such as cycling; Precursor to glutathione; Supplementation raises glutathione levels.^{12,13,14}

Vitamin C

Decreases post-workout soreness; Required for collagen synthesis and thus protects muscles from injury due to trauma or training; Reduces cortisol induced muscle catabolism.^{15,16,17}

Vitamin E

Intense training causes cellular stress; Vitamin E protects the enzymes responsible for repairing this cellular damage.^{18,19}

Vitamin D

Improves bone strength, thus reducing potential for sports-related injuries and stress fractures.^{20,21}

B Vitamins

Cofactors for efficient energy metabolism from food; Synthesizing red blood cells requires B9 (folate) and B12; Deficiencies in various B vitamins may slow healing in sports injuries.^{22,23}

Zinc

Interacts with hormones to improve body composition and strength; Deficiency impairs peak oxygen uptake during exercise; Low zinc common in distance runners & gymnasts; Supplementation should be accompanied by copper.^{24,25,26}

Magnesium

Key to the production of ATP (adenosine triphosphate) which is the body's main storage form of energy; Supplementation may improve aerobic performance and muscle strength and repair.^{27,28}

Serine

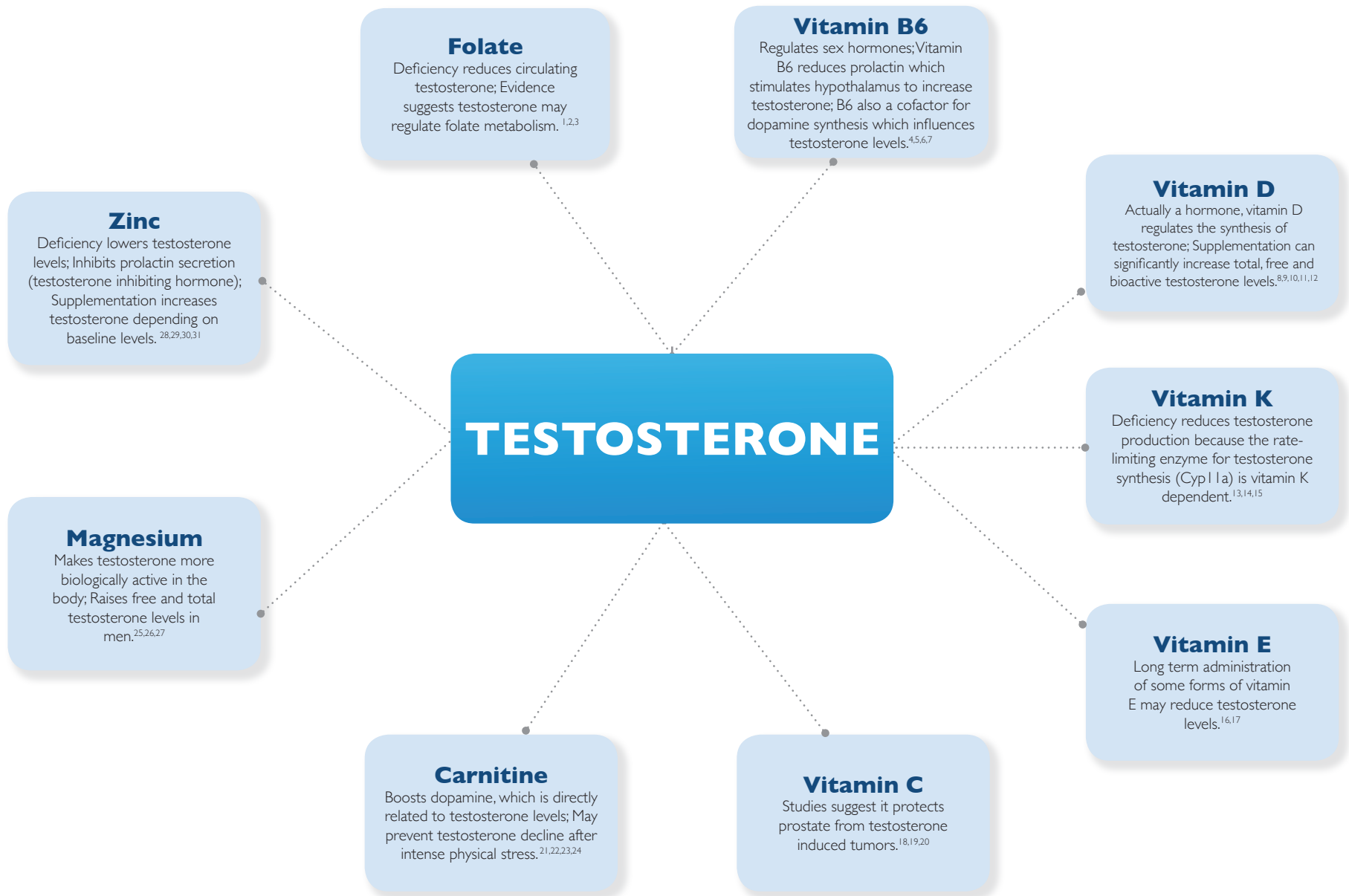
Keeps an athlete's hormone profile healthy by buffering post-workout cortisol levels, which can cause excess muscle breakdown; May increase aerobic capacity.^{29,30,31}

Asparagine

Increases the capacity of muscle to use fatty acids and spare glycogen, thus increasing time to physical exhaustion; Intensive training lowers asparagine levels.^{32,33,34}

Additional nutrients affect athletic performance. This list is non-exhaustive.

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