Product name: Gen50 Kyck
AUST L: 461726
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Evidence Package
Pantothenic Acid (B5)

Table of Contents

Table 6a: Executive Summary of Therapeutic Indications

Indication identifier	System targeted	Therapeutic indication	Required dosage	Specific/ Non-specific
PANTOTHENIC1	**General health or body parts**	• Maintain/support general health and wellbeing • Maintain/support energy production	6 mg	Non-specific
PANTOTHENIC2	Nervous system	• Aid/assist/helps synthesis of neurotransmitters • Maintain/support nervous system health • Maintain/support nervous system function • Support healthy stress response in the body	6 mg	Non-specific
PANTOTHENIC3	Nutrition	• Helps prevent dietary (state vitamin/mineral/nutrient) deficiency • Maintain/support (state vitamin/mineral/nutrient) levels in the body • Aid/assist/helps metabolism of (state vitamin/mineral/nutrient) - Carbohydrates/proteins/fats	6 mg	Non-specific
PANTOTHENIC4	Skin	• Maintain/support wound healing in healthy individuals • Maintain/support skin health • Maintain/support skin repair/healing/regeneration in healthy individuals	6 mg	Non-specific

Table 6b: Evidence Summary for Scientific Indications

INDICATION 1						
Indication	**Evidence reference details**	**Ingredient**	**Dosage**	**Patient population**	**Summary of findings**	**Balance of evidence**
		Plant/animal part and preparation	Daily dosage, frequency & method	Subject, characteristics, health condition, ages, gender, ethnicity	Include enough information to demonstrate relevance and study outcomes. Any justifications from table 4d of Checklist 4 should be included here.	'Primary supporting', 'Secondary supporting'
• Maintain/support general health and wellbeing • Maintain/support	Health Canada Monographs, Health Canada, 2023	Pantothenic acid	adults: 5 mg	N/A	Helps in energy metabolism and in tissue formation. Helps to prevent pantothenic acid deficiency. Helps to maintain the body's ability to metabolize nutrients.	Primary supporting

energy production	GlobinMed, Global Information Hub on Integrated Medicine, 2021	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid plays a number of essential metabolic roles including the production of some hormones and neurotransmitters, and is involved in the metabolism of all carbohydrates, fats, and proteins. After absorption, pantothenic acid is converted to a sulfur-containing compound called pantetheine. Pantetheine is then converted into co-enzyme A, which is the only known biologically active form of pantothenic acid. Functions in the Body Biochemical Reactions Co-enzyme A (CoA), which is the active form of pantothenic acid, helps transfer two-carbon units (acetyl groups) in a wide variety of biochemical reactions. Energy Metabolism Enhances the release of energy from carbohydrates in the Krebs cycle. Anti-stress Effect	Primary supporting

					Synthesis of steroid hormones and proper functioning of the adrenal glands. Fat Synthesis Involved in synthesis of phospholipids, fats, cholesterol, and bile acids. Neurotransmitter Synthesis Involved in synthesis of acetylcholine Red Blood Cells Involved in synthesis of porphyrin in the hemoglobin of red blood cells. Alcohol Detoxification Participates in the metabolism of acetaldehyde Clinical Applications Acne Vulgaris Pantothenic acid deficiency may be a primary cause of acne vulgaris Adrenal Support	

					Pantothenic acid is required for the synthesis of adrenal steroid hormones. Constipation At therapeutic doses peristalsis is stimulated.	
	U.S. Department of Health and Human Services. (2021). Retrieved from National Institute of Health Office of Dietary Supplements website	Pantothenic acid	adults: 5 mg	N/A	The main function of this water-soluble B vitamin is in the synthesis of coenzyme A (CoA) and acyl carrier protein. CoA is essential for fatty acid synthesis and degradation, transfer of acetyl and acyl groups, and a multitude of other anabolic and catabolic processes. Acyl carrier protein's main role is in fatty acid synthesis.	Primary supporting

	Braun, L., & Cohen, M. (2015). Pantothenic acid. In *Herbs & Natural Supplements. An evidence-based guide* (4th ed., pp. 1070-77). Chatswood, NSW: Elsevier Australia.	Pantothenic acid	5 mg	N/A	The organ with the highest concentration of pantothenic acid is the liver, followed by the adrenal cortex, which reflects the large requirements of these tissues and is indicative of the biochemical role of the vitamin's coenzyme derivatives. Most pantothenic acid is used to synthesise or resynthesise CoA. Following its absorption into cells, it can be converted to CoA or acyl carrier proteins (ACP), both of which are essential cofactors in fatty acid synthesis Main Actions Coenzyme function CoA and the Krebs cycle Numerous metabolic activities depend on adequate availability of pantothenate. Pantothenic acid is required for CoA synthesis and most pantothenate-dependent reactions use CoA as the universal donor and acceptor of acetyl and acyl groups. As part of CoA, pantothenate participates extensively in the metabolism of carbohydrate, lipids and protein. It plays a	Primary supporting

					pivotal role in cellular respiration, the oxidation of fatty acids and acetylation of other molecules, so as to enable transportation. Together with thiamine, riboflavin and niacin, it is involved in the oxidative decarboxylation of pyruvate and alpha-ketoglutarate in the Krebs cycle and ultimately is important for energy storage and release Adrenal Cortex Function and Neurotransmitter Synthesis Pantothenic acid is essential in controlling stress and the ability to cope with stressful events, due to its involvement in the synthesis of the neurotransmitter acetylcholine. It plays an important role in adrenal function and, as CoA, is needed for proper adrenal cortex function and the synthesis of steroid hormones, namely cortisone. deficiency of pantothenic acid initially causes adrenal hypertrophy, followed by progressive morphological and functional changes to the adrenal gland, resulting in adrenal hypofunction and an impaired stress response	

					Wound healing Both oral and topical administration has been shown to accelerate closure of wounds and increase strength of scar tissue in vivo. Pantothenic acid has been both used as an oral supplement and applied topically in a cream base to enhance wound healing;	
	Hechtman 2020 *Pantothenic Acid* in Advanced Clinical Naturopathy Pp 676-676 Chatswood, NSW: Elsevier Australia	Pantothenic acid	RDI: 5 mg Therapeutic dose: 5–20 mg		Pantothenic acid exists in most foods as part of two protein complexes – coenzyme A (CoA) (85%) and acyl carrier protein (ACP) – and is essential for numerous biochemical reactions including: lipid, protein and carbohydrate metabolism; fatty acid synthesis and oxidation; and cholesterol and other sterols synthesis. It is also required for the synthesis of substances including haem, acetylcholine and N-acetylglucosamine (essential for connective tissue growth and repair). In addition it is required for vitamin D synthesis and adrenal cortex function.	Primary supporting

	Gaby, A. (2017). Pantothenic acid. In *Nutritional Medicine* (2nd ed., pp. 81-83). Concord, NH: Fritz Perlberg Publishing.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid (also called vitamin B_5) is a component of coenzyme A (CoA), which is involved in the tricarboxylic acid (Krebs) cycle; fatty acid synthesis and oxidation; synthesis of cholesterol, heme, and acetylcholine; and amino acid catabolism	Primary supporting

	Gropper, S., Smith, J., & Carr, T. (2018). Water soluble vitamins. In *Advanced Nutrition and Human Metabolism* (7th ed., pp. 331-35). Boston: Cengage Learning.	Pantothenic acid	adults: 5 mg	N/A	Functions and Mechanisms of Action Pantothenic acid is needed by cells for the synthesis of CoA. Additionally, the 49-phosphopantetheine moiety, upon donation from CoA, is required for the activity of the acyl carrier protein (ACP), a component of the fatty acid synthase complex. CoA serves (functions) as a carrier of acetyl/acyl groups, forming thioester derivatives including acetyl-CoA, propionyl-CoA, malonyl-CoA, and succinyl-CoA, among others. Nutrient Metabolism and Energy Production CoA and its thioester derivatives are found in multiple cellular compartments and function in hundreds of metabolic reactions. It is through these reactions that pantothenic acid as CoA and its derivatives participates extensively in nutrient metabolism, including degradation reactions resulting in energy production and	Primary supporting

					synthetic reactions for the production of vital compounds. The metabolism of carbohydrate, lipids, and protein (energy-producing nutrients) relies to varying degrees on CoA. Pantothenic acid joins thiamin, riboflavin, and niacin in the oxidative decarboxylation of pyruvate In lipid metabolism, CoA is important in the synthesis of cholesterol, ketone bodies, fatty acids, phospholipids, and sphingolipids. Condensation of acetyl-CoA with activated CO2 to form malonyl-CoA represents the first step in fatty acid synthesis (see Figure 5.28). Additionally, many of the compounds produced using CoA are involved in reactions for the synthesis of other compounds. Cholesterol, for example, once produced is used further for the synthesis of bile and steroid hormones, and sphingolipids that are generated are used further for the production of myelin, which is involved in nerve transmission. Acetyl-CoA is also important for the	

					production of neurotransmitters. Acylation, Acetylation, and Cellular Processes Pantothenic acid as part of CoA is also involved in the acetylation and acylation of proteins and sugars as well as some drugs. In addition to proteins, aminosugars, such as glucosamine and galactosamine, are also acetylated by acetyl-CoA to form N-acetyl glucosamine and N-acetyl galactosamine, respectively	

	Therapeutic Research Center. (2023). Pantothenic acid. Retrieved from Natural Medicines website	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is required for intermediary metabolism of carbohydrates, proteins, and lipids. Pantothenic acid is a precursor of coenzyme A, which is required in the acetylation reactions in gluconeogenesis; in the release of energy from carbohydrates; in the synthesis and degradation of fatty acids; and in the synthesis of sterols, steroid hormones, porphyrins, acetylcholine, and other compounds. Pantothenic acid also appears to be essential to normal epithelial function	Primary supporting
	Association of Naturopathic Practitioners. (2020). Pantothenic acid. Retrieved from: Herb Drug Nutrient.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid is a component of coenzyme A (CoA) which is required for ATP production and synthesis of steroid hormones, melatonin and acetylcholine. Pantothenic acid is necessary for the stimulation of antibody production. Pantothenic acid has been shown to stimulate proliferation of dermal fibroblasts and improve wound healing	Primary supporting

	Higdon, J. An Evidence Based Approach to Vitamins and Minerals, Thieme, 2003. pp. 26-29.	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is a component of CoA, an essential coenzyme in a variety of reactions that sustain life. CoA is required for chemical reactions that generate energy from food (fat, carbohydrates and proteins). The synthesis of essential fats, cholesterol, and steroid hormones requires CoA, as does the synthesis of the neurotransmitter acetylcholine, and the hormone melatonin. Heme, a component of haemoglobin, requires a CoA containing compound for its synthesis. Both CoA and the acyl-carrier protein are required for the synthesis of fatty acids. Among these essential fats are spingolipids, which are a component of the myelin sheath that enhances nerve transmission. Another example of these essential fats is the phospholipids that reside in cell membranes. Administration of oral pantothenic acid has been shown to accelerate the closure of skin wounds and increase the strength of scar tissue in animals.	Primary supporting

INDICATION 2						
Indication	**Evidence reference details**	**Ingredient**	**Dosage**	**Patient population**	**Summary of findings**	**Balance of evidence**
		Plant/animal part and preparation	Daily dosage, frequency & method	Subject, characteristics, health condition, ages, gender, ethnicity	Include enough information to demonstrate relevance and study outcomes. Any justifications from table 4d of Checklist 4 should be included here.	'Primary supporting', 'Secondary supporting'

• Aid/assist/helps synthesis of neurotransmitters • Maintain/support nervous system health • Maintain/support nervous system function • Support healthy stress	GlobinMed, Global Information Hub on Integrated Medicine, 2021	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid plays a number of essential metabolic roles including the production of some hormones and neurotransmitters, Functions in the Body Anti-stress Effect Synthesis of steroid hormones and proper functioning of the adrenal glands. Neurotransmitter Synthesis Involved in synthesis of acetylcholine Adrenal Support Pantothenic acid is required for the synthesis of adrenal steroid hormones.	Primary supporting

response in the body	Braun, L., & Cohen, M. (2015). Pantothenic acid. In *Herbs & Natural Supplements. An evidence-based guide* (4th ed., pp. 1070-77). Chatswood, NSW: Elsevier Australia.	Pantothenic acid	5 mg	N/A	Main Actions Adrenal Cortex Function and Neurotransmitter Synthesis Pantothenic acid is essential in controlling stress and the ability to cope with stressful events, due to its involvement in the synthesis of the neurotransmitter acetylcholine. It plays an important role in adrenal function and, as CoA, is needed for proper adrenal cortex function and the synthesis of steroid hormones, namely cortisone. deficiency of pantothenic acid initially causes adrenal hypertrophy, followed by progressive morphological and functional changes to the adrenal gland, resulting in adrenal hypofunction and an impaired stress response	Primary supporting

	Gropper, S., Smith, J., & Carr, T. (2018). Water soluble vitamins. In *Advanced Nutrition and Human Metabolism* (7th ed., pp. 331-35). Boston: Cengage Learning.	Pantothenic acid	adults: 5 mg	N/A	Functions and Mechanisms of Action Pantothenic acid is needed by cells for the synthesis of CoA. Additionally, many of the compounds produced using CoA are involved in reactions for the synthesis of other compounds. Cholesterol, for example, once produced is used further for the synthesis of bile and steroid hormones, and sphingolipids that are generated are used further for the production of myelin, which is involved in nerve transmission. Acetyl-CoA is also important for the production of neurotransmitters. N	Primary supporting
	Therapeutic Research Center. (2023). Pantothenic acid. Retrieved from Natural Medicines website	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is a precursor of coenzyme A, which is required in the the synthesis of acetylcholine, and other compounds.	Primary supporting

	Association of Naturopathic Practitioners. (2020). Pantothenic acid. Retrieved from: Herb Drug Nutrient.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid is a component of coenzyme A (CoA) which is required for synthesis of melatonin and acetylcholine.	Primary supporting
	Higdon, J. An Evidence Based Approach to Vitamins and Minerals, Thieme, 2003. pp. 26-29.	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is a component of CoA, an essential coenzyme in a variety of reactions that sustain life. the synthesis of the neurotransmitter acetylcholine, and the hormone melatonin requires CoA. Both CoA and the acyl-carrier protein are required for the synthesis of fatty acids. Among these essential fats are spingolipids, which are a component of the myelin sheath that enhances nerve transmission.	Primary supporting

INDICATION 3						
Indication	**Evidence reference details**	**Ingredient**	**Dosage**	**Patient population**	**Summary of findings**	**Balance of evidence**
		Plant/animal part and preparation	Daily dosage, frequency & method	Subject, characteristics, health condition, ages, gender, ethnicity	Include enough information to demonstrate relevance and study outcomes. Any justifications from table 4d of Checklist 4 should be included here.	'Primary supporting', 'Secondary supporting'

• Helps prevent dietary (state vitamin/mineral/nutrient) deficiency	Health Canada Monographs, Health Canada, 2023	Pantothenic acid	adults: 5 mg	N/A	Helps to maintain the body's ability to metabolize nutrients.	Primary supporting

• Maintain/support (state vitamin/mineral/nutrient) levels in the body • Aid/assist/helps metabolism of (state vitamin/mineral/nutrient) - Carbohydrates/proteins/fats	GlobinMed, Global Information Hub on Integrated Medicine, 2021	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid plays a number of essential metabolic roles including the production of some hormones and neurotransmitters, and is involved in the metabolism of all carbohydrates, fats, and proteins. Functions in the Body Biochemical Reactions Co-enzyme A (CoA), which is the active form of pantothenic acid, helps transfer two-carbon units (acetyl groups) in a wide variety of biochemical reactions. Energy Metabolism Enhances the release of energy from carbohydrates in the Krebs cycle. Fat Synthesis Involved in synthesis of phospholipids, fats, cholesterol, and bile acids.	Primary supporting

	U.S. Department of Health and Human Services. (2021). Retrieved from National Institute of Health Office of Dietary Supplements website	Pantothenic acid	adults: 5 mg	N/A	The main function of this water-soluble B vitamin is in the synthesis of coenzyme A (CoA) and acyl carrier protein. CoA is essential for fatty acid synthesis and degradation, transfer of acetyl and acyl groups, and a multitude of other anabolic and catabolic processes. Acyl carrier protein's main role is in fatty acid synthesis.	Primary supporting

	Braun, L., & Cohen, M. (2015). Pantothenic acid. In *Herbs & Natural Supplements. An evidence-based guide* (4th ed., pp. 1070-77). Chatswood, NSW: Elsevier Australia.	Pantothenic acid	5 mg	N/A	Main Actions Coenzyme function CoA and the Krebs cycle Numerous metabolic activities depend on adequate availability of pantothenate. Pantothenic acid is required for CoA synthesis and most pantothenate-dependent reactions use CoA as the universal donor and acceptor of acetyl and acyl groups. As part of CoA, pantothenate participates extensively in the metabolism of carbohydrate, lipids and protein. It plays a pivotal role in the oxidation of fatty acids and acetylation of other molecules, so as to enable transportation.	Primary supporting

	Gaby, A. (2017). Pantothenic acid. In *Nutritional Medicine* (2nd ed., pp. 81-83). Concord, NH: Fritz Perlberg Publishing.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid (also called vitamin B_5) is a component of coenzyme A (CoA), which is involved in the tricarboxylic acid (Krebs) cycle; fatty acid synthesis and oxidation; synthesis of cholesterol, heme, and acetylcholine; and amino acid catabolism	Primary supporting

	Gropper, S., Smith, J., & Carr, T. (2018). Water soluble vitamins. In *Advanced Nutrition and Human Metabolism* (7th ed., pp. 331-35). Boston: Cengage Learning.	Pantothenic acid	adults: 5 mg	N/A	Functions and Mechanisms of Action Pantothenic acid is needed by cells for the synthesis of CoA. Nutrient Metabolism and Energy Production CoA and its thioester derivatives are found in multiple cellular compartments and function in hundreds of metabolic reactions. It is through these reactions that pantothenic acid as CoA and its derivatives participates extensively in nutrient metabolism, including degradation reactions resulting in energy production and synthetic reactions for the production of vital compounds. The metabolism of carbohydrate, lipids, and protein (energy-producing nutrients) relies to varying degrees on CoA. Pantothenic acid joins thiamin, riboflavin, and niacin in the oxidative decarboxylation of pyruvate In lipid metabolism, CoA is important in the synthesis of cholesterol, ketone bodies, fatty	Primary supporting

					acids, phospholipids, and sphingolipids Acylation, Acetylation, and Cellular Processes Pantothenic acid as part of CoA is also involved in the acetylation and acylation of proteins and sugars as well as some drugs. In addition to proteins, aminosugars, such as glucosamine and galactosamine, are also acetylated by acetyl-CoA to form N-acetyl glucosamine and N-acetyl galactosamine, respectively.	

	Therapeutic Research Center. (2023). Pantothenic acid. Retrieved from Natural Medicines website	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is required for intermediary metabolism of carbohydrates, proteins, and lipids. Pantothenic acid is a precursor of coenzyme A, which is required in the acetylation reactions in gluconeogenesis; in the release of energy from carbohydrates; in the synthesis and degradation of fatty acids; and in the synthesis of sterols, steroid hormones, porphyrins, acetylcholine, and other compounds.	Primary supporting
	Association of Naturopathic Practitioners. (2020). Pantothenic acid. Retrieved from: Herb Drug Nutrient.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid is a component of coenzyme A (CoA) which is required for ATP production and synthesis of steroid hormones, melatonin and acetylcholine.	Primary supporting

	Higdon, J. An Evidence Based Approach to Vitamins and Minerals, Thieme, 2003. pp. 26-29.	Pantothenic acid	adults: 4-6 mg	N/A	Pantothenic acid is a component of CoA, an essential coenzyme in a variety of reactions that sustain life. CoA is required for chemical reactions that generate energy from food (fat, carbohydrates and proteins). The synthesis of essential fats, cholesterol, and steroid hormones requires CoA, as does the synthesis of the neurotransmitter acetylcholine, and the hormone melatonin. Heme, a component of haemoglobin, requires a CoA containing compound for its synthesis. Both CoA and the acyl-carrier protein are required for the synthesis of fatty acids.	Primary supporting

INDICATION 4						
Indication	**Evidence reference details**	**Ingredient**	**Dosage**	**Patient population**	**Summary of findings**	**Balance of evidence**
		Plant/animal part and preparation	Daily dosage, frequency & method	Subject, characteristics, health condition, ages, gender, ethnicity	Include enough information to demonstrate relevance and study outcomes. Any justifications from table 4d of Checklist 4 should be included here.	'Primary supporting', 'Secondary supporting'
• Maintain/support wound healing in healthy individuals	Health Canada Monographs, Health Canada, 2023	Pantothenic acid	adults: 5 mg	N/A	Helps in tissue formation.	Primary supporting

• Maintain/support skin health • Maintain/support skin repair/healing/regeneration in healthy individuals	Braun, L., & Cohen, M. (2015). Pantothenic acid. In *Herbs & Natural Supplements. An evidence-based guide* (4th ed., pp. 1070-77). Chatswood, NSW: Elsevier Australia.	Pantothenic acid	5 mg	N/A	The organ with the highest concentration of pantothenic acid is the liver, followed by the adrenal cortex, which reflects the large requirements of these tissues and is indicative of the biochemical role of the vitamin's coenzyme derivatives. Most pantothenic acid is used to synthesise or resynthesise CoA. Following its absorption into cells, it can be converted to CoA or acyl carrier proteins (ACP), both of which are essential cofactors in fatty acid synthesis Main Actions Wound healing Both oral and topical administration has been shown to accelerate closure of wounds and increase strength of scar tissue in vivo. Pantothenic acid has been both used as an oral supplement and applied topically in a cream base to enhance wound healing;	Primary supporting

	Association of Naturopathic Practitioners. (2020). Pantothenic acid. Retrieved from: Herb Drug Nutrient.	Pantothenic acid	adults: 5 mg	N/A	Pantothenic acid has been shown to stimulate proliferation of dermal fibroblasts and improve wound healing	Primary supporting
	Higdon, J. An Evidence Based Approach to Vitamins and Minerals, Thieme, 2003. pp. 26-29.	Pantothenic acid	adults: 4-6 mg	N/A	Administration of oral pantothenic acid has been shown to accelerate the closure of skin wounds and increase the strength of scar tissue in animals.	Primary supporting