Cognitive Vitality Reports® are reports written by neuroscientists at the Alzheimer's Drug Discovery Foundation (ADDF). These scientific reports include analysis of drugs, drugs-in-development, drug targets, supplements, nutraceuticals, food/drink, non-pharmacologic interventions, and risk factors. Neuroscientists evaluate the potential benefit (or harm) for brain health, as well as for age-related health concerns that can affect brain health (e.g., cardiovascular diseases, cancers, diabetes/metabolic syndrome). In addition, these reports include evaluation of safety data, from clinical trials if available, and from preclinical models.

Souvenaid

Evidence Summary

Souvenaid is a nutritional drink designed to support the maintenance of neuronal membranes and is well-tolerated. It may allow for better cognition at the earliest stages of decline.

Neuroprotective Benefit: Souvenaid has been associated with a modest slowing of cognitive worsening in AD patients, only at early stages of disease, in RCTs. It does not impact the disease course or show clinical benefit in more advanced stages.

Aging and related health concerns: Souvenaid has not been evaluated for age-related conditions other than neurodegenerative disease.

Safety: Souvenaid shows excellent safety and tolerability as a nutritional drink in clinical trials and real-world use.

Availability: OTC (Medical food product intended for use with medical supervision)	**Dose**: One 125 mL drink/day	Composition of Fortasyn™ Connect Nutrient — Amount Eicosapentaenoic acid 300 mg Docosahexaenoic acid 1200 mg Phospholipids 106 mg Choline 400 mg Uridine monophosphate 625 mg Vitamin E (α-tocopherol equivalent) 40 mg Vitamin C 80 mg Selenium 60 µg Vitamin B12 3 µg Vitamin B6 1 mg Folic acid 400 µg
Half-life: N/A	**BBB**: Many of the nutrients are BBB penetrant.	
Clinical trials: Souvenaid has been tested in two RCTs in mild AD (Souvenir I n=225; Souvenir II n=259) one RCT in mild-to-moderate AD (S-Connect n=527); one RCT in prodromal AD (LipiDiDiet n=382), and one RCT in bv-FTD (n=26).	**Observational studies**: Souvenaid has been found to be well-tolerated when used in combination with symptomatic AD drugs (i.e. acetylcholinesterase inhibitors).	

What is it?

Souvenaid is a nutritional drink produced by Nutricia Advanced Medical Nutrition, a division of Danone. It contains Fortasyn™ Connect, a proprietary blend of nutrients essential for the synthesis of neuronal membranes including choline, uridine, folate, selenium, vitamin C, vitamin E, vitamin B6, vitamin B12, as well as the omega-3 fatty acids, docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA) [1]. Souvenaid has been tested in RCTs for patients with Alzheimer's disease (AD) ranging from mild cognitive impairment (MCI) to moderate disease. It has also been tested in a pilot trial in patients with behavioral variant frontotemporal dementia (bv-FTD).

Neuroprotective Benefit: Souvenaid has been associated with a modest slowing of cognitive worsening in AD patients, only at early stages of disease, in RCTs. It does not impact the disease course or show clinical benefit in more advanced stages.

Types of evidence:

- 2 meta-analyses or systematic reviews of RCTs testing Souvenaid
- 2 RCTs in mild AD (Souvenir I and II)
- 1 RCT in prodromal AD (LipiDiDiet)
- 1 RCT in mild-to-moderate AD (S-Connect)

- 1 RCT in behavioral variantFTD
- 3 post-hoc analyses of data from the LipiDiDiet trial
- 1 expert consensus opinion on Souvenaid
- 2 observational studies for Souvenaid use with AChEI in real-world clinical practice

Human research to suggest prevention of dementia, prevention of decline, or improved cognitive function:

Souvenaid does not have disease modifying properties, but provides the essential nutrients involved in the synthesis pathways of the major phospholipid components of neuronal membranes. The level of these nutrients needed to maintain neuronal membranes is thought to be elevated in patients with neurodegenerative disease due to elevated levels of neuronal damage stemming from disease-related pathology [1]. As a result, supplementation of these nutrients may help these patients meet the increased demand for neuronal membrane component precursors, and thus maintain neuronal function, and in turn cognitive function, for a longer period of time. This type of nutrient supplementation strategy is best suited for individuals in preclinical and prodromal stages of the disease, as it supports endogenous biosynthetic pathways. This is supported by clinical trials showing that those at the earliest stages of disease show the greatest degree of benefit. Additionally, the nutrient profile in the brain is more resistant to change relative to the periphery, thus nutritional approaches often need to be maintained for months or years, as evidenced with Souvenaid where benefits become more apparent with longer term use.

It should be noted that the trials excluded individuals who took omega-3 preparations or regularly consumed oily fish (>twice/week), or vitamins B6, B12, folic acid, vitamin C, or vitamin E of more than 200% of the recommended daily intake [2; 3]. It is unclear whether Souvenaid would offer additional benefit to individuals already consuming a diet rich in the nutrients contained in Souvenaid.

It has not yet been established whether Souvenaid can also protect against age-related cognitive decline by helping to preserve neuronal membrane integrity in the context of vascular, inflammatory, or oxidative damage. A pilot trial (REACTION) tested the effect of Souvenaid on cognitive function in 67 older adults with age-related cognitive decline using virtual assessments (NCT04147624) [4], however, results have not yet been made available.

The ***LipiDiDiet*** study is a randomized, controlled, double-blind, parallel-group, multicenter trial including 11 sites in Finland, Germany, the Netherlands, and Sweden testing Souvenaid (one 125 mL drink once daily) in participants with prodromal AD, as defined by the International Working Group-1 criteria (n=382) [3]. These individuals have mild cognitive impairment (MCI) and the presence of AD pathophysiology. The long-term study was planned for 24 months with an optional 12-month double-blind extension period, and a further option for participation for up to six years. To date, analyses have been conducted for 24 months and 36 months.

The primary endpoint of the study is a change in a neuropsychological test battery (NTB) score. The study was designed based on data from a more advanced stage of disease, which overestimated the rate of decline in a prodromal population, resulting in an underpowered study [3]. There were no differences in the degree of change on the NTB score at the end of 24 months, but there was also very little decline in either group over this time frame. Rates of dementia diagnosis were similar between groups (37% vs 41%). Secondary measures, which are more sensitive to change in this population, did show differences in favor of Souvenaid. Those in the Souvenaid group showed 45% less worsening on the Clinical Dementia Rating -Sum of Boxes (CDR-SB), 26% less worsening of hippocampal atrophy, and 16% less enlargement of ventricular volume. This translates to a delay of disease progression by 10.5 months (95% Confidence Interval [CI] 0.3 to 20.8) based on the change in CDR-SB, and by 7.2 months (95% CI −3.6 to 18.0) based on the change in hippocampal volume [5]. The effect on the CDR-SB was impacted by the baseline degree of cognitive impairment, as measured by the Mini-Mental State Examination (MMSE), such that those least impaired at baseline showed the most benefit with Souvenaid [3]. A post-hoc analysis examined the impact on the Alzheimer's Disease Composite Score (ADCOMS), which consists of cognitive and functional items from the Alzheimer's Disease Assessment Scale – cognitive subscale (ADAS-cog), MMSE, and CDR-SB [6]. The ADCOMS is more sensitive in detecting changes in the particular cognitive and functional domains that are preferentially impacted in patients at early prodromal stages. The estimated mean treatment difference in ADCOMS was -0.048 (95% CI -0.090 to -0.007), or 36% less decline in the active group, with a Cohen's d of 0.31 [6].

The benefits of Souvenaid were more apparent at the 36-month time point. Relative to the placebo group, those in the Souvenaid group showed 60% less decline on the NTB 5-item composite, 76% less decline on the NTB memory domain, 45% less decline on the CDR-SB, and 33% less hippocampal atrophy, with Cohen's d effect sizes ranging from 0.25 to 0.31, indicating small, but meaningful effects [7]. Similar to the 24-month analysis, benefits on the CDR-SB were preferentially driven by those with higher baseline cognition, and there was no difference in dementia diagnoses between groups (43.1% vs

44.3%). Post-hoc analysis using the ADCOMS indicated that Souvenaid was associated with 35% less worsening of disease over 36 months [8]. A 3-level Bayesian hierarchical analysis of primary and secondary clinical outcomes demonstrated a 38% slowing of disease progression and a 99.9% probability of a true effect for the active (Souvenaid) intervention [8].

Human research to suggest benefits to patients with dementia:

The trials conducted to date suggest that while Souvenaid may help slow decline in individuals in prodromal or very early stages of cognitive decline, there does not appear to be an appreciable benefit in patients with more pronounced cognitive decline [1]. Souvenaid is designed to support endogenous pathways of neuronal membrane maintenance and repair, but does not target the underlying disease pathology. As a result, Souvenaid can help boost the brain's capacity to maintain cognitive function in the face of minor damage when endogenous metabolic pathways are largely intact, but no longer offers clinically meaningful benefit for cognition once the degree of pathology overwhelms the capacity for repair and the pathways that utilize the supplied nutrients are no longer functional.

An expert consensus opinion concluded that Souvenaid could be an option for patients with MCI due to AD pathology, and that it may be beneficial when taken for two years or longer. It is not recommended for patients with moderate to advanced AD [9]. An economic evaluation of the cost utility of Souvenaid, administered during the MCI stage, from a societal perspective considering direct and indirect costs based on two-year data from the LipiDiDiet trial found Souvenaid to be cost effective. It had an incremental cost-utility ratio (ICUR) around €23,000/quality-adjusted life year (QALY), which is below the willingness-to-pay thresholds in Spain (€25,000/QALY) and the US ($100,000/QALY).

Alzheimer's disease: POTENTIAL BENEFIT ONLY AT EARLIEST STAGES

Souvenir I was a randomized, double-blind controlled trial testing Souvenaid (one 125 mL drink once daily) in 225 drug-naïve patients with mild AD, with an MMSE score of 20–26, for 12 weeks [10]. The primary outcome measures of the trial were the delayed verbal recall task of the Wechsler Memory Scale–revised (WMS-r), and the 13-item modified Alzheimer's Disease Assessment Scale–cognitive (ADAS-cog 13) subscale at week 12. The planned statistical analysis needed to be changed from mixed-model to nonparametric because of a skewed distribution whereby approximately 40% of participants scored the lowest possible score (0) on the WMS-r delayed recall at baseline. A significant effect (p=0.021) was observed on the WMS-r delayed recall, as improvement was detected in 40% of the

Souvenaid group relative to 24% in the control group at week 12. The Cohen's d effect size was calculated to be 0.20 (95% CI 0.10 to 0.34), indicative of a meaningful effect of small magnitude [11]. A significant benefit in favor of Souvenaid was maintained during the 12-week extension period (n=169). This improvement was primarily driven by those with very mild AD (MMSE 24-26), a subgroup which also demonstrated a significant improvement on the WMS-r immediate recall task [10].
No significant improvements were observed on the ADAS-cog, but there were also no significant declines on this measure in either group. There was a greater percentage of patients classified as responders, based on an improvement of -4 points or more, in the Souvenaid group relative to the control group. There were no significant differences between groups on the secondary measures: the Clinician Interview Based Impression of Change plus Caregiver Input (CIBIC)-plus 7-category scores, 12-item Neuropsychiatric Inventory (NPI), Alzheimer's disease Co-operative Study–Activities of Daily Living (ADCS-ADL), or the Quality of Life in Alzheimer's Disease (QOL-AD).

Souvenir II was a randomized, controlled, double-blind, parallel-group trial testing Souvenaid (one 125 mL drink once daily) in 259 patients with very mild to mild AD (mean MMSE 25) for 24 weeks [2]. The primary outcome of the study was the memory function domain z-score of the Neuropsychological Test Battery (NTB), which showed a benefit in favor of Souvenaid over the 24-week intervention period (change from baseline: +0.202 ± 0.395 vs +0.111 ± 0.463; p = 0.023). The Cohen's d was 0.21 (95% CI -0.06 to -0.49), indicating a small, but meaningful effect [11].

Following the completion of the 24-week trial, 201 participants continued or converted to Souvenaid treatment during the 24-week, open-label extension study. Participants in the active-active group continued to show improvement on the NTB memory domain score, as there was a significant improvement in these scores at week 48 compared to the end of the 24-week RCT [12]. There were no differences observed on the Disability Assessment for Dementia scale in either group.
Souvenaid is intended to support the preservation of synapses by supplying the building blocks of neuronal membranes. Electroencephalography (EEG) measures were assessed as a marker for synaptic connectivity in 179 participants [13]. No consistent relationships were detected between the EEG measures and memory scores. Changes in the beta band (frequency range 12.5 and 30 Hz) were observed in the Souvenaid group relative to the control group based on the clustering coefficient normalized for network size and connectivity (gamma). The gamma decreased in the control group, but remained stable in the Souvenaid group over the 24 weeks. There were no significant effects observed in any of the other frequency bands. An exploratory sub-study including 55 participants of Souveinir II used magnetoencephalography (MEG) as a potential measure of synaptic activity [14]. Postsynaptic

potentials, changes in membrane polarization stemming from synaptic activity, can lead to fluctuations of the electric field which can potentially be measured as oscillations of the magnetic field using MEG. No significant differences between groups were observed on MEG or EEG measures in the sub-study. The inability to detect a difference between the groups may have been related to an atypical control group.

S-Connect was a double-masked clinical trial testing Souvenaid (one 125 mL drink once daily) for 24 weeks in 527 patients with mild to moderate AD (MMSE 14-24) taking symptomatic AD medications [15]. No benefit was detected on the primary outcome, the 11-item ADAS-cog, as declines were observed in both the Souvenaid and control groups over the 24-week study (difference: 0.37 points, Standard Error: 0.57, p = 0.513). Similarly, no differences were observed on the cognitive battery test z-score, ADCS-ADL total score, or CDR-SB.

Although no cognitive benefits were observed in patients with mild to moderate AD taking symptomatic agents in the S-connect trial, a couple of ***small real-world observational studies*** found that the combination of Souvenaid with acetyl-cholinesterase inhibitors (AChEI) was associated with slower cognitive decline relative to either Souvenaid or AChEI alone [16; 17]. A prospective observational study in 60 patients with AD from clinical practice in Spain found that Souvenaid treatment plus AChEI for at least six months was associated with lower monthly increases in the CDR-SB relative to those taking AChEI or Souvenaid alone [16]. Similarly, a retrospective real-world analysis including 220 memory clinic patients with mild AD found that those taking Souvenaid plus AChEI (n=70) showed better improvement on the MMSE (+0.17 points, 95% CI 0.15 to 0.32; Cohen's d = 0.26), the Rey auditory verbal learning test (RAVLT) (+2.15 points, 95% CI 1.07 to 3.23; Cohen's d = 0.75), the semantic verbal fluency test (+0.74 points, 95% CI 0.22 to 1.25; Cohen's d = 0.38), and the trail making test (–9.70 points, 95% CI –19.05 to –3.05; Cohen's d = 0.25) relative to those taking AChEI alone (n=84) at the 12 month follow-up [17]. No significant differences were observed between groups on the symbol digit modalities test (SDMT) or the Boston naming test (BNT).
Mechanistically, a synergistic effect between Souvenaid and AChEI is possible. When choline levels are limiting, neuronal membranes get broken down to extract phosphatidylcholine to use a choline source for the formation of the neurotransmitter acetylcholine [18]. With an adequate supply of choline, neurons can meet their needs for the production of both phosphatidylcholine and acetylcholine.

Frontotemporal dementia (FTD): POTENTIAL BENEFIT IN EARLY STAGES

Souvenaid (125 mL/day) was tested for 12 weeks in a placebo-controlled proof-of-concept trial in 26 patients with behavioral variant FTD with a disease duration less than one year [19]. The study assessed the impact of Souvenaid on executive functions, social cognition, and behavioral disturbances. There were no significant effects on executive function, as measured by the Frontal assessment battery, but there was improvement on the Reading the Mind in the Eyes Test scores, a measure of social cognition, in the Souvenaid group, but not in the placebo group. Additionally, there was a group effect toward the reduction of behavioral symptoms with Souvenaid, based on the Agitation, Apathy, Disinhibition and Irritability domains of the Neuropsychiatric Inventory (NPI). This pilot study suggests that Souvenaid may offer a minor benefit for patients at the early stages of behavioral variant FTD. It is unclear whether, similar to what has been seen with AD, there is an optimal window for benefit restricted to the earliest stages, and whether a similar benefit would be seen in patients with genetic forms of FTD.

Mechanisms of action for neuroprotection identified from laboratory and clinical research:

Neuronal membrane support

The composition of Souvenaid is designed to support the maintenance of neuronal membranes. Changes in the composition of neuronal membranes are a feature of neurodegenerative disease, particularly with respect to the profile of phospholipids, the major component of cell membranes [9]. Phospholipid metabolism has been found to be altered in the context of AD, with deficits appearing early in the disease course, as evidenced by a reduction in levels of metabolites associated with phospholipid synthesis [9]. Circulating levels of nutrients involved in the maintenance of neuronal membranes have also been shown to be reduced in AD patients, which may be related to changes in diet, metabolism, nutrient uptake, and/or increased nutrient demand due to ongoing neuronal damage [9].

The preservation of neuronal membranes may allow for greater preservation of cognitive function in the context of increasing neuronal damage, which is read out clinically as a slowing of cognitive decline. However, boosting the capacity of neuronal membranes to maintain their composition does not impact disease pathophysiology, and as pathology accumulates, the degree of damage eventually exceeds the capacity for repair, resulting in synaptic and neuronal loss.

Kennedy pathway: Souvenaid is designed to provide the nutrients necessary for the Kennedy pathway, the predominant pathway for the synthesis of the major membrane phospholipids, phosphatidylcholine (PC) and phosphatidylethanolamine (PE) [20]. The process involves several intermediate products, and various nutrients act as rate limiting precursors. These include choline for the formation of

phosphocholine; uridine, for the transition of phosphocholine into CDP-choline; and omega-3 fatty acids, such as DHA, for the formation of phosphatidylcholine from CDP-choline. Various additional cofactors, such as vitamins and antioxidants facilitate this process. Souvenaid provides all of these necessary nutrients for the Kennedy cycle with the goal of fostering the maintenance of neuronal membranes, which in turn may support the maintenance of neuronal function and synaptic activity.

Plasma levels of metabolites: An analysis of nutrient-related metabolites from the plasma and/or erythrocyte membranes of participants in the S-Connect RCT, Souvenir I RCT, Souvenir II RCT, and Souvenir II open-label extension studies found that 12 to 24 weeks of Souvenaid intake was associated with significant increases in levels of uridine, choline, selenium, folate, vitamin B6, vitamin B12, vitamin E, DHA, and EPA [21]. The increases were apparent within six weeks and generally reached a plateau such that levels in the 24-week extension study were similar to those seen in the prior 24-week RCT. Preclinical data in animal models suggests that oral administration of these precursors can increase brain levels of phospholipids and promote synaptic health, however, it has not been confirmed that intake of Souvenaid results in increased levels of these nutrients within the brain. Souvenaid also led to significant reductions in plasma homocysteine levels in all of the studies, likely stemming from the activities of vitamin B6, vitamin B12, and folic acid. Changes were not observed in plasma inflammatory markers (CRP, IL-1β, IL-6 and IL-10) or oxidative stress markers (8-isoprostane and MDA) over a 24-week period in the Souvenir I trial in mild AD patients.

MRS data: Phosphorus and proton magnetic resonance spectroscopy (MRS) was used as surrogate non-invasive measures of phospholipid synthesis and breakdown in the brain [22]. Phosphomonoesters (PME) represent phospholipid synthesis, while phosphodiesters (PDEs) represent breakdown products. An exploratory, double-blind, randomized controlled study including 34 participants with mild AD (MMSE ≥20) found an increase in the PME/PDE, or phospholipid synthesis to breakdown ratio, following four weeks of Souvenaid intake (least squares [LS] mean difference 0.18, 95% CI 0.06 to 0.30) [22]. Additionally, there was an increase in levels of total choline-containing compounds (LS mean difference 0.01, 95% CI 0.00 to 0.02). There were no significant differences on other MRS measures in this study.

FDG-PET: The effects of Souvenaid on cerebral glucose metabolism, as a surrogate measure of synaptic function, was assessed in the exploratory double-blind randomized controlled NL-ENIGMA trial, which assessed the impact of Souvenaid (125 mL drink/day) for 24 weeks on [^{18}F]FDG-PET measures in 50 patients with MCI (MMSE 25-30) or mild AD (MMSE 20-24) [23]. No significant differences were seen in any of the five predefined brain regions of interest, however, there was no decline in cerebral

metabolism in the control group over the course of the study, which may have impacted the ability to detect an effect. The study may have been too short to detect an effect and/or FDG-PET may not be a suitable method to detect minor changes in synaptic function.

APOE4 interactions: In the LipiDiDiet trial, the effect of Souvenaid on cognitive measures was not affected by ApoE4 carrier status [7].

Aging and related health concerns: Souvenaid has not been evaluated for age-related conditions other than neurodegenerative disease.

Types of evidence:

- 0 meta-analyses or systematic reviews
- 0 clinical trials
- 0 observational studies
- 0 laboratory studies

Souvenaid has only been evaluated for conditions related to cognitive health.

Safety: Souvenaid shows excellent safety and tolerability as a nutritional drink in clinical trials and real-world use.

Types of evidence:

- 2 meta-analyses or systematic reviews of RCTs testing Souvenaid
- 2 RCTs in mild AD (Souvenir I and II)
- 1 RCT in prodromal AD (LipiDiDiet)
- 1 RCT in mild-to-moderate AD (S-Connect)
- 1 RCT in behavioral variant FTD
- 2 observational studies for Souvenaid use with AChEI in real-world clinical practice

Souvenaid has been found to be well-tolerated in clinical and observational studies, with a high degree of compliance by study participants (>90%). Meta-analyses of RCTs testing Souvenaid have found that adverse events were low across studies and that there were no differences in the rates of adverse

events (Odds Ratio [OR]: 0.84, 95% CI 0.63 to 1.12) or serious adverse events (OR: 0.95, 95% CI 0.66 to 1.36) in those taking Souvenaid relative to those in control groups receiving an isocaloric drink [1; 24]. Most adverse events were deemed unrelated to the study product. Gastrointestinal events tended to be the most common events deemed "possibly" or "probably" related to the study product in both the Souvenaid and control groups [22]. Across studies, there were no clinically relevant changes in laboratory safety measures and vital signs, including mean systolic blood pressure, diastolic blood pressure, and heart rate [12]. Observational studies indicate that Souvenaid can be safely used in combination with symptomatic AD drugs, namely acetylcholinesterase inhibitors [16; 17]. Longer term data from the LipiDiDiet Study suggests that Souvenaid is well-tolerated and not associated with health risks when taken continuously for three years [7].

Drug interactions: Souvenaid has not been found to have significant drug interactions, though caution may be warranted in taking additional supplements containing high levels of some of the vitamins contained in Souvenaid. Some individuals may be allergic to some of the ingredients in Souvenaid, and Souvenaid is not recommended for individuals with galactosaemia [1].

Sources and dosing:

Souvenaid is available from Nutricia, a division of Danone. As of April 17, 2023, Souvenaid became available to the U.S. market (Press release). It is a medical food product that is recommended to be used under medical supervision. It is a once daily drink (125 mL) available in several flavors. The full nutritional profile and ingredient list, as provided by the manufacturer from the global site, are listed below.

Ingredients: (from manufacturer)
Water, maltodextrin, sugar, fish oil, cow's milk proteins, flavoring (vanilla), uridine 5`-monophosphate sodium salt, thickeners (microcrystalline cellulose, sodium carboxymethylcellulose), choline chloride, calcium citrate, soy lecithin, acidity regulator (citric acid), sodium L-ascorbate, potassium citrate, DL-α-tocopheryl acetate, magnesium hydroxide, sodium citrate, potassium hydroxide, color (curcumin), ferrous lactate, zinc sulphate, pyridoxine hydrochloride, copper gluconate, nicotinamide, manganese sulphate, calcium D-pantothenate, pteroylmonoglutamic acid, thiamin hydrochloride, retinyl acetate, riboflavin, sodium selenite, chromium chloride, sodium molybdate, potassium iodide, phytomenadione, D-biotin, cyanocobalamin, cholecalciferol.

Souvenaid: nutritional composition adapted from manufacturer

Contents	per 125 mL serving
Energy	525 kJ / 125 kcal
Protein (12 Energy%)	3.75 g
Carbohydrate (36 Energy%):	16.5 g
Sugars	8 g
Lactose	<0.031 g
Fat (36 Energy%):	4.9 g
Saturates	1.6 g
Monounsaturates	0.9 g
Polyunsaturates	1.9 g
Eicosapentaenoic acid (EPA)	360 mg
Docosapentaenoic acid (DHA)	1200 mg
Dietary fibre	0.69 g
Minerals and trace elements:	
Sodium	125 mg
Potassium	187.5 mg
Chloride	156.25 mg
Calcium	100 mg
Phosphorus	87.5 mg
Phosphate	271.25 mg
Magnesium	25 mg
Iron	2 mg
Zinc	1.5 mg
Copper	225 µg
Manganese	0.41 mg
Molybdenum	12.5 µg
Selenium	60 µg
Chromium	8.4 µg
Iodine	16.25 µg

Vitamins:	
Vitamin A	200 µg-retinol equivalent
Vitamin D3	0.875 µg
Vitamin E	40 mg α-tocopherol equivalent
Vitamin K	7.71 µg
Thiamin (B1)	0.19 mg
Riboflavin (B2)	0.2 mg
Niacin (B3)	2.25 mg- niacin equivalent
Pantothenic acid (B5)	0.66 mg
Vitamin B6	1 mg
Folic acid	400 µg
Vitamin B12	3 µg
Biotin	5 µg
Vitamin C	80 mg
Others:	
Uridine-5'-monophosphate (UMP)	625 mg
Choline	400 mg

Research underway:

Souvenaid is being tested as part of the Dutch multimodal lifestyle intervention study (FINGER-NL) in older adults at risk of cognitive decline (NCT05256199).

Souvenaid is being tested in a feasibility study as a nutritional intervention in a randomized controlled non-blinded trial in adults with acute traumatic brain injury (NCT04418440).

Search terms:

Pubmed, Google: Souvenaid

- Alzheimer's disease, clinical trial, meta-analysis, safety

Websites visited for Souvenaid:

- Clinicaltrials.gov

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