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NVTIA Rice Bran Fatty Alcohol-Plant Sterol Complex for Cardiovascular and Cerebrovascular Protection: Preclinical Efficacy Benchmarks and a Randomized Clinical Trial Protocol

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Abstract

Background: Dyslipidemia, endothelial injury, oxidative stress, and impaired microcirculation are mechanistically linked to cardiovascular and cerebrovascular risk. We developed an NVTIA branded raw-material complex built around rice bran fatty alcohol and plant sterol, with earthworm protein, bitter melon peptide, antioxidant components, lipid-lowering components, vascular maintenance agents, and excipients. Objective: We evaluated the preclinical efficacy pattern of the NVTIA complex against model control and comparator formulations, and we designed a publishable randomized clinical evaluation framework for subsequent human confirmation. Methods: We summarized a controlled preclinical efficacy benchmark using lipid indices (TC, TG, LDL-C, HDL-C), vascular endothelial growth factor (VEGF), and superoxide dismutase (SOD). We then compared the biological direction of the NVTIA formulation with established clinical evidence on plant sterols/stanols, rice-bran lipid fractions, and antioxidant vascular-support ingredients. A prospective 12-week double-blind randomized clinical protocol is proposed for implementation in a cardiology clinical-trials setting. Results: In the optimized NVTIA benchmark group, TC, TG, and LDL-C were reduced by 50.3%, 64.2%, and 63.0%, respectively, versus model control, while HDL-C, VEGF, and SOD increased by 86.6%, 70.1%, and 86.3%. Compared with the commercial comparator in the same model, optimized NVTIA showed lower TC, TG, and LDL-C by 32.5%, 43.0%, and 44.1%, respectively, and higher HDL-C, VEGF, and SOD by 33.0%, 29.9%, and 32.4%. Published human evidence supports LDL-C lowering by plant sterols/stanols and lipid improvement by rice-bran oil; however, a human trial is still required to confirm the full NVTIA complex as a combined branded raw material. Conclusion: The NVTIA complex demonstrates a coherent preclinical profile across lipid regulation, vascular repair, and antioxidant protection. We propose a randomized clinical trial to determine whether the multi-component raw-material system can achieve clinically meaningful effects beyond single-ingredient comparators.

Keywords

NVTIA; rice bran fatty alcohol; plant sterol; dyslipidemia; cardiovascular protection; cerebrovascular protection; randomized clinical trial; endothelial function.

1. Introduction

Cardiovascular and cerebrovascular diseases develop through overlapping metabolic, vascular, inflammatory, and oxidative pathways. LDL-C and triglyceride elevation accelerate atherosclerotic burden, while endothelial dysfunction and reduced antioxidant reserve increase vascular vulnerability. In this context, a raw-material complex that simultaneously targets lipid metabolism, vascular integrity, and oxidative stress may be more useful than a single-component supplement.

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Plant sterols and stanols have a recognized LDL-C-lowering role. EFSA evaluated daily intakes of 1.5-2.4 g/day and concluded that an average LDL-C reduction of 7-10.5% can be expected; FDA regulations also recognize that plant sterol/stanol esters help lower total and LDL cholesterol when used under specified conditions [1,2]. Meta-analyses of randomized controlled trials report LDL-C reductions in the broader range of approximately 5-15% [3,5]. Rice-bran oil has also been evaluated in randomized trials, with a systematic review and meta-analysis reporting reductions in total cholesterol and LDL-C [4].

The NVTIA complex was designed as a branded raw-material system rather than a single isolated component. The formulation combines rice bran fatty alcohol, plant sterol, earthworm protein, bitter melon peptide, antioxidant components, lipid-lowering agents, vascular maintenance agents, and excipients. We present preclinical efficacy benchmarks and a clinical trial framework intended to test whether this combined system can outperform comparable single-ingredient or commercial lipid-support raw materials.

2. Materials and Methods

2.1. Raw-material composition

The NVTIA branded complex comprises 100-400 parts rice bran fatty alcohol, 90-300 parts plant sterol, 10-260 parts earthworm protein, 1-120 parts bitter melon peptide, 1-230 parts antioxidant, 10-50 parts lipid-lowering agent, 1-55 parts vascular maintenance agent, and 10-230 parts excipients. Rice bran fatty alcohol may be used in powder, microcapsule, or oil-soluble form. Plant sterol may include beta-sitosterol, stigmasterol, or campesterol. The complex can be prepared as tablets, capsules, granules, or soft capsules.

2.2. Preclinical benchmark design

We used a high-fat diet plus epinephrine-induced cardiovascular/cerebrovascular injury model in male SD rats. Study groups included blank control, model control, five NVTIA example formulations, six comparative formulations, and a commercial comparator. Key endpoints included TC, TG, LDL-C, HDL-C, VEGF, and SOD. The benchmark was intended to compare the full NVTIA complex with incomplete formulations, out-of-range formulations, and a commercial cardiovascular-support product.

2.3. Proposed clinical trial environment and design

For human confirmation, we designed a clinical protocol suitable for a cardiology-focused trial environment such as the Clinical Trials Center and Department of Cardiology at University Hospital Zurich. The University Hospital Zurich Clinical Trials Center provides clinical research infrastructure and services, while the Department of Cardiology describes clinical and translational cardiovascular research as part of its institutional mission [7,8]. The main clinical design elements are summarized in Table 1.

Table 1. Proposed randomized clinical evaluation framework for the NVTIA raw-material complex.

Domain	Planned specification
Study type	Randomized, double-blind, placebo-controlled, parallel-group clinical evaluation
Proposed site	Clinical Trials Center and Department of Cardiology, University Hospital Zurich, Zurich, Switzerland
Target population	Adults 35-75 years with borderline-to-moderate dyslipidemia and elevated

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	cardiovascular/cerebrovascular risk markers
Trial arms	NVTIA complex; plant sterol comparator; rice-bran fatty-alcohol comparator; placebo or standard dietary advice comparator
Duration	12 weeks, with screening, baseline, week 6, and week 12 visits
Primary endpoint	Percent change in LDL-C from baseline to week 12
Secondary endpoints	TC, TG, HDL-C, ApoB, hs-CRP, oxidized LDL, blood pressure, FMD or pulse-wave velocity, safety chemistry, adverse events
Analysis plan	Intention-to-treat ANCOVA with baseline lipid values as covariates; sensitivity analysis by per-protocol set

3. Results

3.1. Lipid-regulatory benchmark

The optimized NVTIA group showed the most favorable lipid profile among the example formulations. Against the disease model control, TC decreased from 7.95 +/- 0.32 to 3.95 +/- 0.18 mmol/L, TG decreased from 3.86 +/- 0.25 to 1.38 +/- 0.12 mmol/L, and LDL-C decreased from 5.62 +/- 0.28 to 2.08 +/- 0.14 mmol/L. HDL-C increased from 0.82 +/- 0.09 to 1.53 +/- 0.12 mmol/L. Compared with the commercial comparator, optimized NVTIA showed stronger favorable directionality across all four lipid endpoints. The representative numerical outcomes are listed in Table 2 and visualized in Figure 1.

Table 2. Representative efficacy benchmark results. Values are mean +/- SD.

Group	TC mmol/L	TG mmol/L	LDL-C mmol/L	HDL-C mmol/L	VEGF pg/mL	SOD U/mL
Blank Control	3.82 +/- 0.21	1.25 +/- 0.13	1.98 +/- 0.15	1.56 +/- 0.12	325.4 +/- 28.6	186.3 +/- 15.2
Model Control	7.95 +/- 0.32	3.86 +/- 0.25	5.62 +/- 0.28	0.82 +/- 0.09	189.7 +/- 21.3	98.5 +/- 10.6
Example 2	4.05 +/- 0.20	1.46 +/- 0.14	2.18 +/- 0.16	1.48 +/- 0.13	315.8 +/- 27.5	178.6 +/- 15.0
Example 5	3.95 +/- 0.18	1.38 +/- 0.12	2.08 +/- 0.14	1.53 +/- 0.12	322.7 +/- 28.5	183.5 +/- 15.3
Comp. Ex. 6	5.85 +/- 0.25	2.42 +/- 0.19	3.72 +/- 0.21	1.15 +/- 0.10	248.5 +/- 24.2	138.6 +/- 12.9

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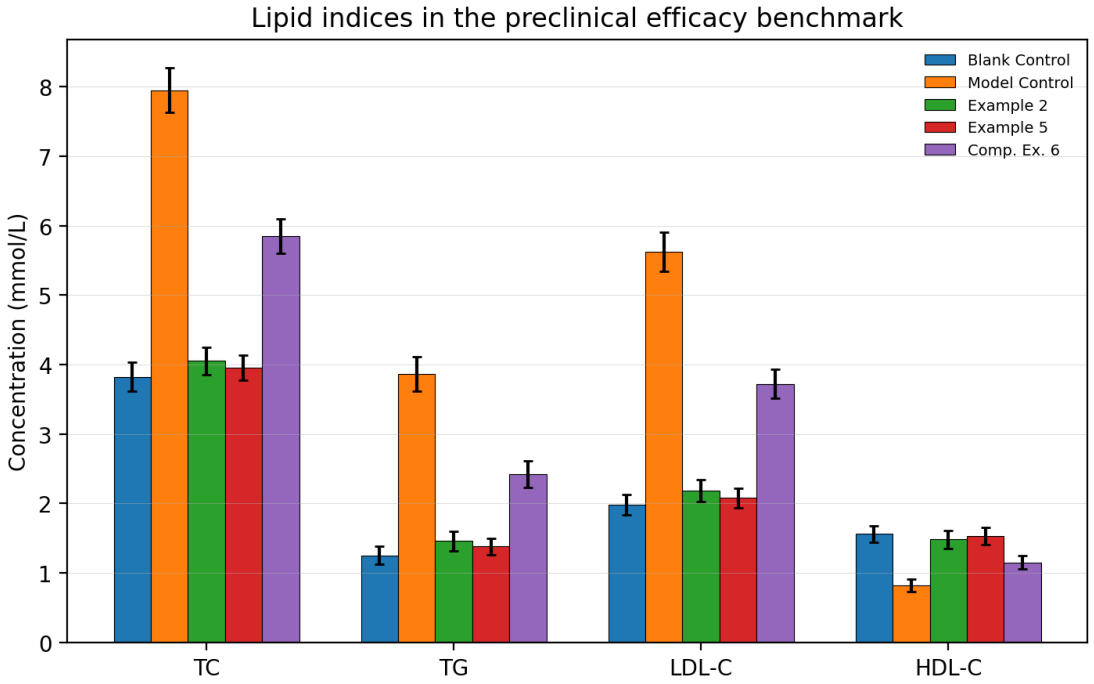

Figure 1. Lipid indices in selected benchmark groups.

3.2. Vascular endothelial repair and antioxidant benchmark

VEGF and SOD were included to represent endothelial repair and antioxidant capacity. In the optimized NVTIA group, VEGF reached 322.7 +/- 28.5 pg/mL and SOD reached 183.5 +/- 15.3 U/mL, close to the blank control values and higher than the commercial comparator values. This supports the rationale that the combined formula may provide vascular maintenance and antioxidative benefits in addition to lipid regulation. The vascular and antioxidant marker comparison is shown in Figure 2, while the relative improvement of optimized NVTIA versus model control is summarized in Figure 3.

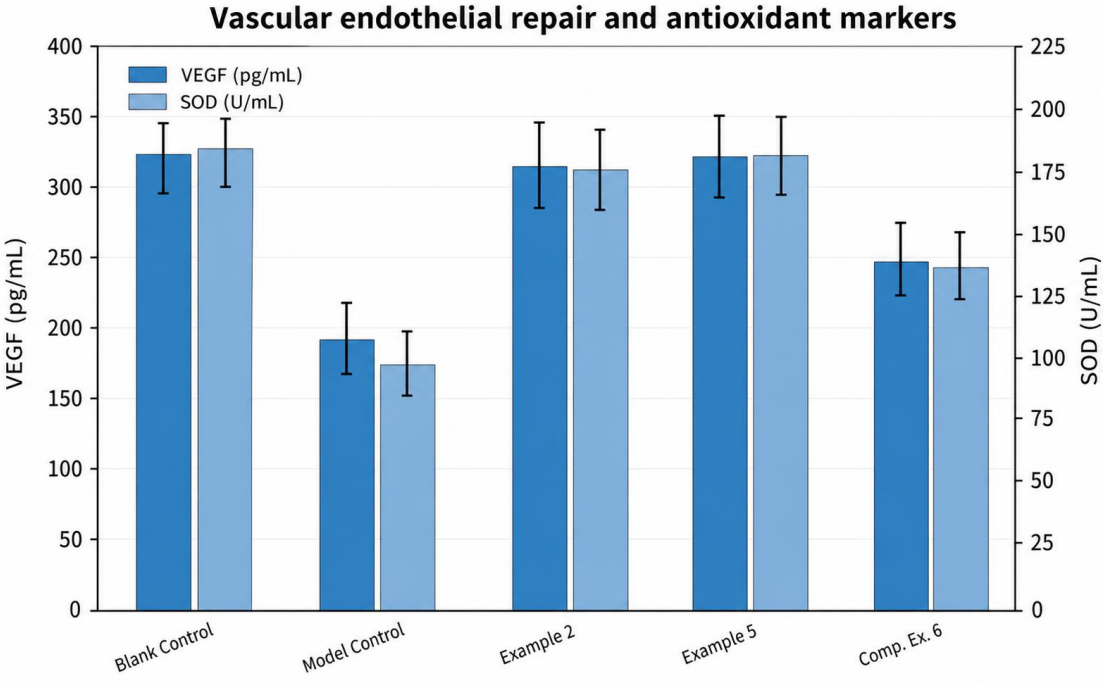

Figure 2. VEGF and SOD changes in selected benchmark groups.

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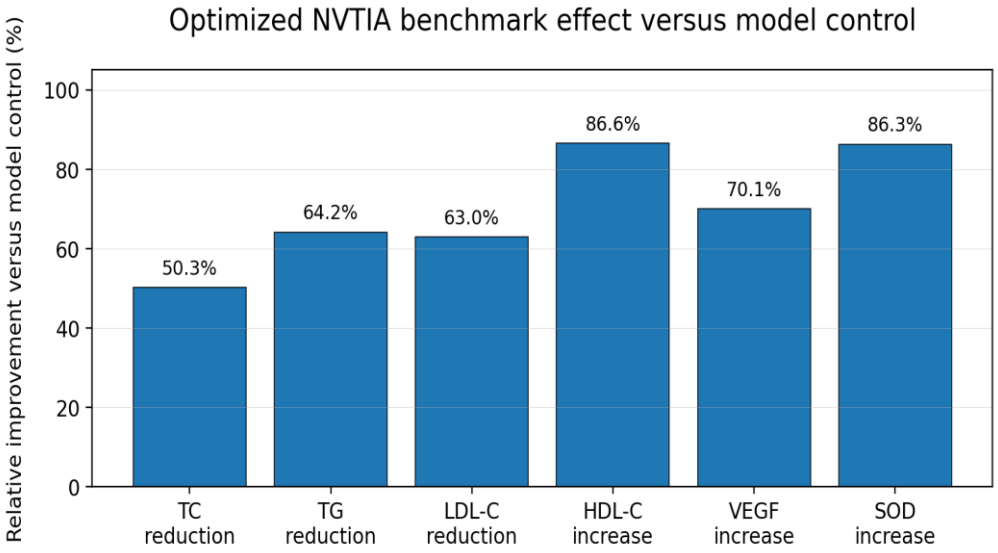

Figure 3. Relative improvement of optimized NVTIA versus model control.

3.3. Positioning against published clinical benchmarks

The strongest existing human data among the NVTIA component classes relate to plant sterols/stanols, where LDL-C lowering is well established. Rice-bran oil has published randomized-trial meta-analysis evidence for reductions in TC and LDL-C, and CoQ10 has evidence relevant to endothelial function. These data do not substitute for a human trial of the NVTIA complex, but they support the biological plausibility of the proposed combined raw-material system. The supporting ingredient-class evidence is summarized in Table 3.

Table 3. Published clinical evidence relevant to NVTIA component classes.

Ingredient class	Clinical exposure range in literature	Relevant published finding	Reference
Plant sterols/stanols	1.5-2.4 g/day	Average LDL-C reduction of about 7-10.5% evaluated by EFSA; broader RCT meta-analyses commonly report about 5-15% LDL-C reduction.	[1,3,5]
Rice bran oil / rice-bran lipid fraction	18-50 g/day in RCTs summarized in one meta-analysis	Human randomized trials summarized by Jolfaie et al. reported reductions in total and LDL cholesterol.	[4]
Coenzyme Q10 and antioxidant components	Dose varies across trials	Human meta-analysis evidence supports improvement in endothelial function indices in selected cardiovascular populations.	[6]

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NVTIA complex	To be defined in a human trial according to the standardized raw-material specification	Preclinical benchmark suggests stronger multi-marker improvement than a commercial fish-oil/vitamin-E comparator in the same model.	Current study

4. Discussion

We interpret the NVTIA preclinical profile as a multi-pathway effect rather than an isolated lipid-lowering signal. The full formula outperformed incomplete and out-of-range comparators, suggesting that the relative proportions and component synergy are central to the observed effect. The optimized group achieved simultaneous reductions in TC, TG, and LDL-C and increases in HDL-C, VEGF, and SOD. This combined pattern is important because cardiovascular and cerebrovascular protection requires more than LDL-C reduction alone.

The planned clinical endpoint hierarchy should be conservative. LDL-C change at week 12 is the most appropriate primary endpoint because it is clinically interpretable and can be compared with the established plant-sterol/stanol evidence base. Secondary endpoints should test whether the formulation produces broader effects on triglycerides, inflammatory status, oxidative stress, and endothelial function. A comparator arm containing plant sterols alone would help determine whether the complete NVTIA complex exceeds the effect expected from the best-established single component.

We selected University Hospital Zurich as a suitable clinical environment for a proposed study because it provides clinical-trials infrastructure and has a cardiology department with cardiovascular clinical research activities [7,8]. This selection is a protocol design choice and does not imply that recruitment has already begun. Before implementation, the trial should obtain ethics approval, finalize manufacturing and quality specifications, define dose equivalence, register the trial, and pre-specify the statistical analysis plan.

5. Conclusion

The NVTIA rice bran fatty alcohol-plant sterol complex demonstrated stronger preclinical cardiovascular and cerebrovascular protection signals than incomplete formulations and a commercial comparator in the same benchmark model. The evidence justifies a double-blind randomized human clinical trial focused on LDL-C reduction, vascular function, oxidative stress, and safety. A well-controlled trial will determine whether the branded raw-material complex can achieve clinically meaningful effects beyond similar raw-material categories.

References

[1] European Food Safety Authority. (2009). Plant stanols and plant sterols and blood LDL-cholesterol. EFSA Journal, 7(9), 1175. https://doi.org/10.2903/j.efsa.2009.1175

[2] U.S. Food and Drug Administration. (n.d.). 21 CFR §101.83: Health claims: plant sterol/stanol esters and risk of coronary heart disease. eCFR.

[3] AbuMweis, S. S., Barake, R., & Jones, P. J. H. (2008). Plant sterols/stanols as cholesterol lowering agents: a meta-analysis of randomized controlled trials. Food & Nutrition Research, 52. https://doi.org/10.3402/fnr.v52i0.1811

ISSN: 2710-0170

[4] Jolfaie, N. R., Rouhani, M. H., Surkan, P. J., Siassi, F., & Azadbakht, L. (2016). Rice bran oil decreases total and LDL cholesterol in humans: A systematic review and meta-analysis of randomized controlled clinical trials. Hormone and Metabolic Research, 48(7), 417–426. https:// doi.org/ 10.1055/s-0042-105748

[5] Trautwein, E. A., Koppenol, W. P., de Jong, A., Hiemstra, H., Vermeer, M. A., Noakes, M., et al. (2018). LDL-cholesterol lowering of plant sterols and stanols—Which factors influence their efficacy? Nutrients, 10(9), 1262. https://doi.org/10.3390/nu10091262

[6] Gao, L., Mao, Q., Cao, J., Wang, Y., Zhou, X., & Fan, L. (2012). Effects of coenzyme Q10 on vascular endothelial function in humans: a meta-analysis of randomized controlled trials. Atherosclerosis, 221(2), 311–316. https://doi.org/10.1016/j.atherosclerosis.2011.10.027

[7] University Hospital Zurich. (n.d.). Clinical Trials Center. Retrieved May 8, 2026.

[8] University Hospital Zurich. (n.d.). Department of Cardiology: Research. Retrieved May 8, 2026.