RonanRx
PERSONALIZED MEDICINE

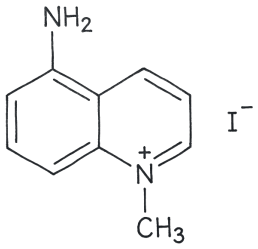
CLINICAL MONOGRAPH · METABOLIC & LONGEVITY (UNDER FDA REVIEW)

5-Amino 1MQ

NNMT-inhibitor research ingredient with case-by-case review

5-Amino-1MQ (5-amino-1-methylquinolinium) is an experimental small molecule that blocks an enzyme called NNMT [neelakantan2017_obesity]. It has been tested in mice, where it lowers body weight on a high-fat diet, and in test-tube studies of cancer-associated fibroblasts [eckert2019]. There are no published human studies of 5-amino-1MQ, no human safety data, no human pharmacokinetic data, and no clinical trials [puleo2026].

5-Amino 1MQ has no FDA approval in the United States. This ingredient is part of an evolving FDA review process. Physicians may submit patient-specific prescription requests for pharmacy review. Availability is determined case by case, and availability may change after FDA review, PCAC discussion, final agency action, or state-board guidance.



EVIDENCE POSTURE PRECLINICAL

REVIEWED **2026-05-11**

State-licensed 503A | Pharmacist reviewed | Doctor led | Cold-chain ready | Patient choice preserved

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FOR CLINICIANS

5-amino-1MQ is a small-molecule competitive inhibitor of nicotinamide N-methyltransferase (NNMT, EC 2.1.1.1), an S-adenosylmethionine-dependent enzyme that methylates nicotinamide to 1-methylnicotinamide. NNMT consumes one methyl group per turn from the cellular methyl donor pool, and elevated NNMT expression in adipose tissue and stromal cells has been linked to perturbed cellular methylation balance and metabolic disease in rodent and cellular models [kraus2014, eckert2019, roberti2021]. The Neelakantan group reported the initial small-molecule NNMT inhibitor series including 5-amino-1MQ, with structure-activity relationship work [neelakantan2017_sar] and characterization of a noncoupled fluorescent enzymatic assay [neelakantan2017_assay]. The same group then reported that 5-amino-1MQ at oral doses of 20 mg/kg reversed high-fat-diet-induced obesity in mice [neelakantan2017_obesity].

Mechanistic and translational work in mouse models has subsequently characterized NNMT inhibition in obesity-related metabolic dysfunction [babula2024], exercise-mediated muscle adaptation in aged mice [dimet2024_muscle], gut microbiome changes in diet-induced obese mice [dimet2022_microbiome], beige adipogenesis [jia2022], and cancer-associated fibroblast biology in ovarian carcinoma [eckert2019]. Genetic NNMT deficiency in male mice improves diet-induced-obesity insulin sensitivity without altering body composition independent of obesity [brachs2019]. A tricyclic NNMT inhibitor series with activity in mouse metabolic models has also been reported [ruf2022, kannt2018, ruf2018]. Rat pharmacokinetics for 5-amino-1MQ specifically have been characterized by LC-MS/MS bioanalysis [awosemo2021], showing oral bioavailability of approximately 40%. No human pharmacokinetic, safety, or efficacy data are published.

5-Amino 1MQ has no FDA approval in the United States. This ingredient is part of an evolving FDA review process. Physicians may submit patient-specific prescription requests for pharmacy review. Availability is determined case by case, and availability may change after FDA review, PCAC discussion, final agency action, or state-board guidance.

Why Personalized 5-Amino 1MQ

The evidence base for 5-Amino 1MQ is primarily preclinical. Published work centers on NNMT inhibition, adipose biology, and metabolic models, without an FDA-approved product or a mature human efficacy and safety program.

Physicians may submit patient-specific prescription requests for 5-Amino 1MQ for pharmacy review. Certain preparations may be available now when clinically appropriate, lawfully prescribed, supported by patient-specific documentation, and approved by the dispensing pharmacy. Availability is determined case by case. This is not a consumer access promise; it is a clinical, sourcing, formulation, and regulatory review process. This ingredient is part of an evolving FDA review process for bulk substances used in compounding.

A physician-submitted request keeps 5-Amino 1MQ out of the consumer research-chemical lane and forces the practical questions: what is the patient-specific rationale, what source can be verified, what formulation is feasible, and whether a pharmacist can release it.

Quick Facts About 5-Amino 1MQ

Category: Small-molecule nicotinamide N-methyltransferase (NNMT) inhibitor

Active ingredient: 5-amino-1-methylquinolinium iodide, a quinolinium-class methyltransferase substrate mimic of nicotinamide; not a peptide despite frequent marketing as such

FDA-approved branded forms: None. 5-amino-1MQ has never been the subject of an FDA-approved drug application and has not entered an FDA-cleared human investigational new drug (IND) program at the time of this review.

Route: Studied in mice by intraperitoneal injection and oral gavage; oral bioavailability characterized in rat pharmacokinetic work

Evidence posture: Entirely preclinical. Published evidence consists of in vitro enzymatic studies, cellular methylation assays, and rodent (mouse and rat) in vivo studies. No published human pharmacokinetic, safety, or efficacy data.

FDA-approval status: Category 2, evolving FDA review process. Valid patient-specific prescription required; supporting clinical rationale may be requested.

Compounded under: Physicians may submit patient-specific prescription requests for pharmacy review. Availability is determined case by case.

Important framing: 5-amino-1MQ is sold in unregulated 'longevity peptide' channels despite being a small molecule, not a peptide. Distribution channels for research-grade material are not subject to pharmaceutical-grade identity, purity, sterility, or endotoxin controls.

SPECIALS: PATIENT-SPECIFIC PRESCRIPTION ONLY

Physicians may submit patient-specific prescription requests for 5-Amino 1MQ for pharmacy review. Certain preparations may be available now when clinically appropriate, lawfully prescribed, and approved by the dispensing pharmacy. Availability is determined case by case.

- **Made to order, not off a shelf.** No batch sits in a warehouse waiting for buyers. Your prescription triggers the prep.
- **Named-patient label.** The bottle carries one patient's name. The batch records carry one prescription.
- **Dose, strength, and route chosen for the patient.** A prescriber decides what gets compounded, not a manufacturer who set the strength for a trial population.
- **Licensed pharmacist on the hook.** A real person, with a license that can be pulled, signs off on every prep. State inspectors check the facility.
- **Compounded drugs are not FDA-approved.** They should not be evaluated using branded-drug trial data alone. Availability varies by state and prescribed medication.

How This Differs from a Research-Use-Only Website

A research-use-only website ships a vial from a warehouse. There is no prescription, no pharmacist, no facility inspection, and no way to recall the product if something is wrong with it. If the vial is mislabeled, contaminated, or under-potent, there is nobody whose license is at stake.

A 503A compounding pharmacy is the other thing. The doctor writes the prescription. A licensed pharmacist, whose name is on the label, prepares the medicine in a facility the state inspects. If something goes wrong, there is a person and a license on the hook, and a documented chain of custody on every lot. That accountability is what makes it safe.

What is 5-Amino 1MQ?

5-amino-1MQ is the common abbreviation for 5-amino-1-methylquinolinium iodide, a small-molecule inhibitor of the enzyme nicotinamide N-methyltransferase. Structurally it is a methylated quinolinium scaffold designed to mimic the trimethylammonium product of NNMT catalysis (1-methylnicotinamide) and to occupy the nicotinamide-binding pocket of the enzyme [neelakantan2017_sar]. The compound is a small heterocycle, not a peptide; marketing of 5-amino-1MQ as a 'longevity peptide' is taxonomically incorrect and reflects the unregulated channel through which research-grade material is sold rather than any pharmacological reality.

5-amino-1MQ was disclosed as part of a Watowich-group series of methyl-quinolinium NNMT inhibitors. The structure-activity relationship paper [neelakantan2017_sar] reported the lead compound profile, and a separate paper [neelakantan2017_assay] reported the noncoupled fluorescent enzymatic assay used to

characterize inhibitor potency. The in vivo proof-of-concept study [neelakantan2017_obesity] used 5-amino-1MQ at 20 mg/kg in diet-induced-obese mice. Subsequent rat pharmacokinetic work by the same group [awosemo2021] established an LC-MS/MS bioanalytical method and reported approximately 40% oral bioavailability, an elimination half-life of approximately 3 hours, and dose-proportional plasma exposure over the studied dose range. No human PK has been published.

How 5-Amino 1MQ Works

Nicotinamide N-methyltransferase (NNMT) is a cytosolic methyltransferase that transfers a methyl group from S-adenosyl-L-methionine (SAM) to nicotinamide, producing 1-methylnicotinamide and S-adenosyl-L-homocysteine (SAH). Each turn of the enzyme consumes one methyl group from the cellular methyl-donor pool and one molecule of nicotinamide from the cellular NAD+ salvage pathway. Elevated NNMT activity in adipose tissue, liver, and stromal compartments has been associated in rodent and cellular models with reduced cellular methylation capacity, altered NAD+ metabolism, and metabolic dysfunction [kraus2014, roberti2021].

5-amino-1MQ is reported as a competitive, methyl-acceptor-site-directed inhibitor of NNMT with cellular permeability sufficient to lower 1-methylnicotinamide formation in intact adipocytes and rodent tissues [neelakantan2017_sar, neelakantan2017_obesity]. Hypothesized downstream effects, observed in mouse models, include restoration of cellular methylation balance, increased polyamine flux, and altered adipocyte SAM:SAH ratio. The therapeutic hypothesis under research is that small-molecule NNMT inhibition could mimic the metabolic phenotype of NNMT-knockdown rodents [kraus2014, brachs2019]. This hypothesis has not been tested in humans.

Biological Role of 5-Amino 1MQ

Nicotinamide N-methyltransferase sits at the intersection of two major metabolic pools, the cellular methyl-donor pool (SAM/SAH) and the NAD+ salvage pathway [kraus2014; dimet2024_muscle; roberti2021]. Nicotinamide released from NAD+ consumption can either feed back into NAD+ regeneration via nicotinamide phosphoribosyltransferase (NAMPT) or be terminally methylated by NNMT to 1-methylnicotinamide and excreted. NNMT thereby acts as a regulator of how much nicotinamide returns to NAD+ versus exits the cell as a methylated end product [eckert2019].

Tissue-specific expression of NNMT is high in liver, kidney, and adipose tissue. Elevated NNMT expression has been described in obesity, in certain cancer-associated stromal compartments, and in aging tissues in rodent and cellular models [eckert2019]. The therapeutic hypothesis is that lowering NNMT activity restores methyl-donor and NAD+ flux toward beneficial outcomes. This hypothesis is supported in mouse models but has not been tested in humans.

Detailed Mechanism of 5-Amino 1MQ

The Kraus et al. 2014 Nature paper [kraus2014] established the metabolic-disease relevance of NNMT by showing that antisense-oligonucleotide knockdown of Nnmt in adipose tissue and liver of diet-induced-obese mice protected against weight gain and improved insulin sensitivity. The mechanism proposed by Kraus and colleagues centers on NNMT acting as a methyl-group sink: by methylating nicotinamide to a pharmacologically inert end product (1-methylnicotinamide), NNMT consumes SAM that would otherwise support histone and DNA methylation and consumes nicotinamide that would otherwise feed NAD+ salvage. Loss of NNMT activity therefore increases SAM availability, methylation flux at certain histone marks, polyamine flux, and adipocyte energy expenditure in the rodent setting.

The Neelakantan series of small-molecule NNMT inhibitors was developed against this biological hypothesis. The 2017 structure-activity relationship paper [neelakantan2017_sar] characterized a quinolinium-scaffold inhibitor series with cellular potency, and the companion in vivo paper [neelakantan2017_obesity] reported that 5-amino-1MQ administered to diet-induced-obese mice reversed weight gain over multi-week dosing, reduced adipose tissue mass, and improved glucose handling. Genetic confirmation came from Brachs et al. 2019 [brachs2019], which reported that male Nnmt-knockout mice on a high-fat diet had improved insulin sensitivity (but did not change body composition independent of obesity-related effects). Subsequent rodent work has expanded the phenotype: Babula et al. 2024 [babula2024] reported that pharmacologic NNMT inhibition mitigated obesity-related metabolic dysfunction in mice; Dimet-Wiley et al. 2024 [dimet2024_muscle] reported that NNMT inhibition mimicked and boosted exercise-mediated muscle function improvements in aged mice; Dimet-Wiley et al. 2022 [dimet2022_microbiome] reported a distinct gut microbiome signature in calorie-restricted NNMT-inhibitor-treated diet-induced-obese mice; Jia et al. 2022 [jia2022] characterized depot-specific induction of NNMT during beige adipogenesis.

An orthogonal therapeutic context comes from oncology. Eckert et al. 2019 (Nature) [eckert2019] used quantitative proteomics to identify NNMT as a master metabolic regulator of cancer-associated fibroblasts in ovarian cancer, with NNMT inhibition reversing fibroblast-driven tumor phenotypes in patient-derived xenograft models. This stromal-NNMT pathway has been substantially extended in subsequent cancer biology literature.

Medicinal chemistry around NNMT has continued in parallel. Kannt et al. 2018 [kannt2018] reported a small-molecule NNMT inhibitor with activity in a mouse metabolic model from the Sanofi/Aurigene program; Ruf et al. 2018 [ruf2018] described a novel nicotinamide-analog inhibitor; Ruf et al. 2022 [ruf2022] reported a tricyclic small-molecule NNMT inhibitor series for metabolic disorders; Policarpo et al. 2019 [policarpo2019] disclosed high-affinity alkynyl bisubstrate inhibitors useful as chemical-biology tools. The 2026 Trends in Pharmacological Sciences review [puleo2026] catalogs the broader field

including 5-amino-1MQ as a chemical-biology probe and tool compound, with no NNMT-inhibitor program having entered human trials at the time of the review.

5-Amino 1MQ Research History

Interest in NNMT as a metabolic-disease target was crystallized by the Kraus et al. 2014 Nature paper [kraus2014], which reported that antisense-oligonucleotide knockdown of Nnmt in adipose tissue and liver protected diet-induced-obese mice from weight gain and improved insulin sensitivity. This work motivated medicinal chemistry programs aimed at identifying drug-like small-molecule NNMT inhibitors.

The Watowich group at the University of Texas Medical Branch published a series of papers in 2017 characterizing the first dedicated small-molecule NNMT inhibitors. Neelakantan et al. (Biochemistry, 2017) [neelakantan2017_assay] reported a noncoupled fluorescent assay for real-time monitoring of NNMT activity. Neelakantan et al. (Journal of Medicinal Chemistry, 2017) [neelakantan2017_sar] reported the structure-activity relationship for the methyl-quinolinium series, of which 5-amino-1MQ is the most-cited compound. Neelakantan et al. (Biochemical Pharmacology, 2018) [neelakantan2017_obesity] reported that the membrane-permeable small-molecule NNMT inhibitors of this series, including 5-amino-1MQ, reversed high-fat-diet-induced obesity in mice. Rat pharmacokinetics of 5-amino-1MQ were subsequently reported by Awosemo et al. (J Pharm Biomed Anal, 2021) [awosemo2021]: an LC-MS/MS bioanalytical assay was developed and applied to single-dose PK in rats with approximately 40% oral bioavailability and roughly 3-hour elimination half-life.

Parallel medicinal chemistry programs reported additional NNMT inhibitor chemotypes. Kannt et al. (Scientific Reports, 2018) [kannt2018] reported a Sanofi/Aurigene small-molecule NNMT inhibitor with activity in a mouse metabolic model; Ruf et al. (Bioorg Med Chem Lett, 2018) [ruf2018] reported a novel nicotinamide-analog inhibitor; Ruf et al. (Scientific Reports, 2022) [ruf2022] reported a tricyclic chemotype for metabolic disorders; Policarpo et al. (J Med Chem, 2019) [policarpo2019] reported high-affinity alkynyl bisubstrate inhibitors as chemical-biology tools. Genetic NNMT deficiency was characterized by Brachs et al. (Diabetes, 2019) [brachs2019] in male mice on diet-induced obesity, with improved insulin sensitivity but no body-composition change independent of obesity. The 2021 Molecular Metabolism review by Roberti et al. [roberti2021] consolidated the field at that point.

Subsequent in vivo work in mouse models has expanded the phenotype. Dimet-Wiley et al. (Scientific Reports, 2022) [dimet2022_microbiome] reported a distinct gut microbiome signature when an NNMT inhibitor was combined with calorie restriction in diet-induced-obese mice. Jia et al. (J Physiol Biochem, 2022) [jia2022] reported depot-specific induction of NNMT during beige adipogenesis. Dimet-Wiley et al. (Scientific Reports, 2024) [dimet2024_muscle] reported that NNMT inhibition mimicked and boosted exercise-mediated muscle function in aged mice. Babula et al. (Diabetes Obes Metab, 2024) [babula2024] reported that NNMT inhibition mitigated obesity-related metabolic dysfunction. In oncology, Eckert et al. (Nature, 2019) [eckert2019] identified NNMT as a master metabolic regulator of cancer-associated

fibroblasts in ovarian carcinoma. The 2026 Trends in Pharmacological Sciences review by Puleo et al. [puleo2026] frames the NNMT inhibitor field as preclinical with no asset having entered an IND-enabled human program at the time of the review.

5-Amino 1MQ Timeline

2014 • Kraus et al [kraus2014]. (Nature), antisense knockdown of Nnmt in adipose and liver protects diet-induced-obese mice from weight gain; establishes NNMT as a metabolic-disease target

2017 • Neelakantan et al [neelakantan2017_assay]. (Biochemistry), noncoupled fluorescent assay for direct real-time monitoring of NNMT activity

2017 • Neelakantan et al [neelakantan2017_sar]. (J Med Chem), structure-activity relationship for the methyl-quinolinium series of small-molecule NNMT inhibitors, including 5-amino-1MQ

2018 • Neelakantan et al [neelakantan2017_obesity]. (Biochemical Pharmacology), selective, membrane-permeable small-molecule NNMT inhibitors including 5-amino-1MQ reverse high-fat-diet-induced obesity in mice at 20 mg/kg oral dosing

2018 • Kannt et al [kannt2018]. (Scientific Reports), Sanofi/Aurigene small-molecule NNMT inhibitor with activity in a mouse metabolic model

2018 • Ruf et al [ruf2018]. (Bioorg Med Chem Lett), novel nicotinamide-analog NNMT inhibitor

2019 • Brachs et al [brachs2019]. (Diabetes), genetic Nnmt deficiency in male mice improves insulin sensitivity in diet-induced obesity without altering body composition independent of obesity

2019 • Eckert et al [eckert2019]. (Nature), proteomics identifies NNMT as a master metabolic regulator of cancer-associated fibroblasts in ovarian carcinoma; NNMT inhibition reverses fibroblast-driven tumor phenotypes in patient-derived xenograft models

2019 • Policarpo et al [policarpo2019]. (J Med Chem), high-affinity alkynyl bisubstrate NNMT inhibitors as chemical-biology tools

2021 • Awosemo et al [awosemo2021]. (J Pharm Biomed Anal), LC-MS/MS assay for 5-amino-1MQ in rat plasma; oral bioavailability of approximately 40% and elimination half-life of approximately 3 hours in rats

2021 • Roberti et al [roberti2021]. (Molecular Metabolism), review of NNMT at the crossroads of cellular metabolism and epigenetic regulation

2022 • Dimet-Wiley et al [dimet2022_microbiome]. (Scientific Reports), NNMT inhibitor combined with calorie restriction in diet-induced-obese mice produces a distinct gut microbiome signature

2022 • Jia et al [jia2022]. (J Physiol Biochem), NNMT is dynamically induced during beige adipogenesis in adipose tissues in a depot-specific manner

2022 • Ruf et al [ruf2022]. (Scientific Reports), tricyclic small-molecule NNMT inhibitors for metabolic disorders

2024 • Babula et al [babula2024]. (Diabetes Obes Metab), pharmacologic NNMT inhibition mitigates obesity-related metabolic dysfunction in mice

2024 • Dimet-Wiley et al [dimet2024_muscle]. (Scientific Reports), NNMT inhibition mimics and boosts exercise-mediated muscle function improvements in aged mice

2026 • Puleo et al [puleo2026]. (Trends in Pharmacological Sciences), review frames NNMT inhibitors as a preclinical class; no asset including 5-amino-1MQ has entered an IND-enabled human program at the time of writing

Clinical Contexts for 5-Amino 1MQ

Diet-induced obesity (mouse model) PRECLINICAL

Preclinical in vivo evidence only. No human studies of 5-amino-1MQ for obesity have been published.

Neelakantan et al. 2018 [neelakantan2017_obesity] reported that 5-amino-1MQ at 20 mg/kg by oral gavage in diet-induced-obese mice reversed weight gain over multi-week dosing, reduced adipose tissue mass, and improved glucose handling. The original 2014 Nature paper by Kraus et al. [kraus2014] using antisense-oligonucleotide Nnmt knockdown in adipose and liver in diet-induced-obese mice produced a directionally similar phenotype, and genetic Nnmt-deficient male mice [brachs2019] showed improved insulin sensitivity on a high-fat diet. Subsequent mouse work [babula2024, dimet2022_microbiome] has extended the obesity-related phenotype. The translation of these mouse findings to humans is not established; no human pharmacokinetic, safety, or efficacy data for 5-amino-1MQ have been published.

Aging-related muscle function (mouse model) PRECLINICAL

Preclinical in vivo evidence only. No human studies of 5-amino-1MQ for sarcopenia, frailty, or muscle function have been published.

Dimet-Wiley et al. 2024 [dimet2024_muscle] reported that NNMT inhibition (using a tool inhibitor structurally related to 5-amino-1MQ) mimicked and boosted exercise-mediated improvements in muscle function in aged mice. The translation of this mouse finding to human sarcopenia or frailty is not established.

Ovarian cancer-associated fibroblast biology (preclinical) PRECLINICAL

In vitro and patient-derived-xenograft evidence in ovarian carcinoma; NNMT inhibition as a stromal-targeted concept. No human studies of 5-amino-1MQ in any cancer indication.

Eckert et al. 2019 (Nature) [eckert2019] used quantitative proteomics to identify NNMT as a master metabolic regulator of cancer-associated fibroblasts in ovarian carcinoma. NNMT inhibition in patient-derived xenograft models reversed fibroblast-driven tumor phenotypes. The 2026 Trends in Pharmacological Sciences review [puleo2026] frames the cancer-stroma NNMT axis as an active research area without any clinical-stage NNMT inhibitor at the time of writing.

Compounded 5-Amino 1MQ (503A)

Physicians may submit patient-specific prescription requests for pharmacy review. For 5-Amino 1MQ, certain preparations may be available now when clinically appropriate, lawfully prescribed, and approved by the dispensing pharmacy. Availability is determined case by case and may depend on patient-specific documentation, ingredient status, source qualification, formulation feasibility, state requirements, and pharmacist judgment. The review starts with the evidence constraint: The evidence base for 5-Amino 1MQ is primarily preclinical. Published work centers on NNMT inhibition, adipose biology, and metabolic models, without an FDA-approved product or a mature human efficacy and safety program.

This ingredient is part of an evolving FDA review process. RonanRx is monitoring FDA's PCAC process and any subsequent agency action. This ingredient is part of an evolving FDA review process for bulk substances used in compounding. Availability may change after FDA review, PCAC discussion, final agency action, or state-board guidance. For 5-Amino 1MQ, RonanRx ties that monitoring to the evidence limits described above and to any patient-specific documentation submitted by the prescriber.

Valid patient-specific prescription required. Supporting clinical rationale may be requested. Compounded medications are not FDA-approved. No consumer self-ordering, no office stock, no bulk dispensing. Requests for 5-Amino 1MQ are reviewed before any preparation is made or released. A physician-submitted request keeps 5-Amino 1MQ out of the consumer research-chemical lane and forces the practical questions: what is the patient-specific rationale, what source can be verified, what formulation is feasible, and whether a pharmacist can release it.

5-Amino 1MQ Formulations and Routes

Form	Concentration	Description
Research-grade laboratory material	Typically supplied as 5-amino-1-methylquinolinium iodide solid for	If a patient-specific 5-Amino 1MQ request is approved after pharmacy review, the route and formulation must be selected by the prescriber

Form	Concentration	Description
(not a pharmaceutical product)	laboratory dissolution; not a pharmaceutical-grade formulation	and dispensing pharmacy for that named patient. Research-use presentations sold online are not RonanRx preparations.

Routes used in published literature: oral, subcutaneous, intramuscular.

5-Amino 1MQ Dosing

Route	Population	Range	Duration	Study type
Oral (mouse)	Diet-induced-obese C57BL/6 mice	20 mg/kg/day by oral gavage in the Neelakantan 2018 in vivo study	Several weeks (multi-week dosing in the published in vivo work)	Preclinical mouse in vivo, not a human dosing recommendation
Oral (rat PK)	Sprague-Dawley rats, single-dose pharmacokinetic study	Single oral doses with LC-MS/MS quantification; approximately 40% oral bioavailability and ~3 h elimination half-life in rats	Single dose	Preclinical pharmacokinetics, not a human dosing recommendation
Human	None, no published human dose-finding, pharmacokinetic, safety, or efficacy data	Case-by-case after pharmacy review	—	No published human data

There is no published human dose for 5-amino-1MQ. Mouse studies use 20 mg/kg oral; rat pharmacokinetic studies use single doses for bioanalytical method validation [awosemo2021]. Direct allometric scaling from rodent to human is not a substitute for human pharmacokinetic and safety data. The 2026 Trends in Pharmacological Sciences review of the NNMT inhibitor field [puleo2026] notes that no NNMT inhibitor has reached an IND-enabled human program at the time of writing.

RonanRx does not publish a consumer dosing schedule for 5-Amino 1MQ. Any request requires a valid patient-specific prescription, supporting clinical rationale, and pharmacist review. Route, strength, dosing interval, monitoring expectations, and dispensing quantity would be determined case by case from the prescriber's documentation and pharmacy feasibility review.

5-Amino 1MQ Safety

No published human safety data for 5-amino-1MQ exist at the time of this review [17]. The published evidence base is preclinical in vitro and in mice and rats. Rodent studies have not reported overt acute toxicity at doses used for efficacy (20 mg/kg oral in diet-induced-obese mice [4]) and bioanalytical pharmacokinetic studies in rats [5] have characterized plasma exposure but were not designed as toxicology studies. Formal GLP toxicology, genotoxicity, reproductive toxicology, and chronic-exposure studies that would normally support an FDA IND have not been published for 5-amino-1MQ.

Theoretical safety considerations follow from NNMT's role at the intersection of the methyl-donor and NAD+ salvage pathways. Sustained NNMT inhibition could in principle alter SAM:SAH ratio, histone and DNA methylation patterns, polyamine flux, and NAD+ availability across tissues [17]. None of these theoretical signals have been characterized in humans for this molecule. Pharmacovigilance for compounds sold through unregulated 'research chemical' or 'longevity peptide' channels is poor; adverse events are not reported into FAERS in any structured way.

Because Physicians may submit patient-specific prescription requests for pharmacy review. Availability is determined case by case. Clinicians who become aware that a patient is self-administering material labeled '5-amino-1MQ' should regard the situation as exposure to an unregulated investigational compound of unknown human pharmacokinetics, toxicology, and contamination profile [18].

Contraindications

Honest gap. No published human contraindication, drug-interaction, or adverse-event data for 5-amino-1MQ. The compound has no FDA labeling and no IND-enabled human program at the time of the search. Contraindications cannot be enumerated without human exposure data.

Searched: PubMed, ClinicalTrials.gov, FDA Drugs@FDA on 2026-05-11 · terms *5-amino-1-methylquinolinium contraindications; 5-amino-1MQ human; NNMT inhibitor clinical trial*.

Drug interactions

Honest gap. No published human drug-interaction studies for 5-amino-1MQ. NNMT acts at the intersection of S-adenosylmethionine and NAD+ metabolism, so theoretical interactions with NAD+ precursors, methyl-donor supplements, and other methyltransferase substrates are conceivable but have not been characterized in humans.

Searched: PubMed, ClinicalTrials.gov, DailyMed on 2026-05-11 · terms *5-amino-1MQ drug interaction; NNMT inhibitor drug interaction; 1-methylnicotinamide drug interaction human*.

Adverse events

Honest gap. No published human adverse-event data for 5-amino-1MQ. FAERS pharmacovigilance signals are not interpretable for a research-grade compound that is not on the regulated supply chain. Mouse and rat preclinical work has not been designed as formal toxicology and does not substitute for human safety data.

Searched: PubMed, FAERS, ClinicalTrials.gov on 2026-05-11 · terms *5-amino-1-methylquinolinium adverse event; 5-amino-1MQ safety; NNMT inhibitor human safety*.

Monitoring 5-Amino 1MQ Therapy

No RonanRx-specific monitoring protocol has been established for 5-Amino 1MQ. If a patient-specific prescription is submitted, supporting clinical rationale may be requested, and monitoring expectations would be reviewed case by case against the published evidence, route, sterile or nonsterile status, concomitant therapies, and patient risk factors.

5-Amino 1MQ in Special Populations

5-Amino 1MQ Evidence Quality

Evidence for 5-amino-1MQ is preclinical only. The published corpus includes: a 2014 antisense-oligonucleotide knockdown study in mice that motivated the field [kraus2014]; the Neelakantan/Watowich 2017 medicinal chemistry and assay papers [neelakantan2017_sar, neelakantan2017_assay]; a 2018 in vivo paper reporting reversal of high-fat-diet-induced obesity in mice at 20 mg/kg oral [neelakantan2017_obesity]; a 2021 rat pharmacokinetic paper [awosemo2021]; a 2019 genetic Nnmt-knockout paper in mice [brachs2019]; a 2019 ovarian cancer-associated-fibroblast paper [eckert2019]; multiple 2018, 2024 mouse studies extending the metabolic phenotype to muscle, microbiome, and aging contexts; medicinal chemistry papers on parallel NNMT-inhibitor chemotypes; and review-level synthesis [roberti2021, puleo2026]. The 2026 Trends in Pharmacological Sciences review by Puleo et al [policarpo2019; babula2024; dimet2022_microbiome]. [puleo2026] frames the entire NNMT inhibitor class as preclinical with no asset having reached an IND-enabled human program at the time of the review [kannt2018; ruf2018].

There are no published human pharmacokinetic, safety, efficacy, or pharmacodynamic data for 5-amino-1MQ. Mouse-to-human translation for novel mechanisms, particularly mechanisms that act on cellular methylation and NAD+ flux, cannot be assumed without dedicated human studies. RonanRx therefore frames 5-amino-1MQ as a preclinical research molecule, not as a candidate for 503A compounding [ruf2022; dimet2024_muscle; jia2022].

Major 5-Amino 1MQ Clinical Studies

Study	Design	Participants	Duration	Finding
Kraus et al. (2014, Nature), antisense Nnmt knockdown in diet-induced-obese mice	Preclinical in vivo, antisense-oligonucleotide knockdown of Nnmt in adipose tissue and liver of diet-induced-obese mice	—	—	Nnmt knockdown protected against weight gain and improved insulin sensitivity; established NNMT as a metabolic-disease target and motivated subsequent small-molecule programs [kraus2014]
Neelakantan et al. (2017, J Med Chem), methyl-quinolinium SAR	Medicinal chemistry, structure-activity relationship for the methyl-quinolinium small-molecule NNMT inhibitor series, including 5-amino-1MQ	—	—	Established the SAR around the methyl-quinolinium scaffold, identifying cellular-permeable inhibitors of NNMT with sub-µM cellular potency [neelakantan2017_sar]
Neelakantan et al. (2017, Biochemistry), fluorescent assay for NNMT activity	Enzymatic assay development, noncoupled fluorescent direct real-time monitoring of NNMT activity	—	—	Established the bioassay used to characterize the methyl-quinolinium inhibitor series [neelakantan2017_assay]
Neelakantan et al. (2018, Biochem Pharmacol), 5-amino-1MQ in diet-induced obesity	Preclinical in vivo, selective membrane-permeable small-molecule NNMT inhibitors including 5-amino-1MQ in diet-induced-obese mice	—	—	5-amino-1MQ at 20 mg/kg oral reversed high-fat-diet-induced weight gain in mice, reduced adipose tissue mass, and improved glucose handling over multi-week dosing [neelakantan2017_obesity]
Awosemo et al. (2021, J Pharm Biomed Anal), rat PK of 5-amino-1MQ	Bioanalytical method development and rat single-dose pharmacokinetic study	—	—	LC-MS/MS assay validated for 5-amino-1MQ in rat plasma; approximately 40% oral bioavailability and elimination half-life of approximately 3 hours in rats; no human PK has been published [awosemo2021]

Study	Design	Participants	Duration	Finding
Brachs et al. (2019, Diabetes), Nnmt-knockout mice on high-fat diet	Preclinical in vivo, genetic Nnmt-deficient male mice on a diet-induced-obesity protocol	—	—	Genetic Nnmt deficiency improved insulin sensitivity on a high-fat diet but did not change body composition independent of obesity [brachs2019]
Eckert et al. (2019, Nature), NNMT in cancer-associated fibroblasts	Quantitative proteomics in ovarian cancer-associated fibroblasts plus in vitro and patient-derived xenograft pharmacology	—	—	NNMT identified as a master metabolic regulator of cancer-associated fibroblasts; NNMT inhibition reversed fibroblast-driven tumor phenotypes in patient-derived xenograft models [eckert2019]
Babula et al. (2024, Diabetes Obes Metab), NNMT inhibition in obesity	Preclinical mouse in vivo, pharmacologic NNMT inhibition in obesity-related metabolic dysfunction	—	—	NNMT inhibition mitigated obesity-related metabolic dysfunction in mice, extending the Neelakantan 2018 phenotype to additional metabolic readouts [babula2024]
Dimet-Wiley et al. (2024, Sci Rep), NNMT inhibition and exercise in aged mice	Preclinical mouse in vivo, NNMT inhibition with and without exercise in aged mice	—	—	NNMT inhibition mimicked and boosted exercise-mediated improvements in muscle function in aged mice [dimet2024_muscle]
Dimet-Wiley et al. (2022, Sci Rep), NNMT inhibition and microbiome	Preclinical mouse in vivo, NNMT inhibitor combined with calorie restriction in diet-induced-obese mice	—	—	NNMT inhibition combined with calorie restriction produced a distinct gut microbiome signature in diet-induced-obese mice [dimet2022_microbiome]
Jia et al. (2022, J Physiol Biochem), NNMT in beige adipogenesis	Preclinical mouse in vivo and adipocyte cell culture	—	—	NNMT is dynamically induced during beige adipogenesis in adipose tissues in a depot-specific manner [jia2022]
Kannt et al. (2018, Sci Rep), Sanofi/Aurigene NNMT inhibitor	Medicinal chemistry plus preclinical mouse in vivo for a small-molecule NNMT inhibitor	—	—	A non-quinolinium NNMT inhibitor with activity in a mouse metabolic model, parallel chemotype to 5-amino-1MQ [kannt2018]
Policarpo et al. (2019, J Med		—	—	

Study	Design	Participants	Duration	Finding
Chem), bisubstrate NNMT inhibitors	Medicinal chemistry, alkynyl bisubstrate inhibitors of NNMT			High-affinity chemical-biology tool compounds; not intended as drug candidates [policarpo2019]
Ruf et al. (2022, Sci Rep), tricyclic NNMT inhibitors	Medicinal chemistry plus preclinical mouse model	—	—	Novel tricyclic chemotype with activity in mouse metabolic models, additional parallel chemotype to 5-amino-1MQ [ruf2022]
Puleo et al. (2026, Trends Pharmacol Sci), NNMT inhibitor translation review	Narrative review of the NNMT inhibitor field as of early 2026	—	—	Frames NNMT inhibitors as a preclinical class; no asset including 5-amino-1MQ has reached an IND-enabled human program at the time of the review [puleo2026]

5-Amino 1MQ Pharmacokinetics & Pharmacodynamics

Pharmacokinetics

Pharmacokinetic data for 5-amino-1MQ exist only in rats. Awosemo et al. 2021 [awosemo2021] developed and validated an LC-MS/MS bioanalytical assay for 5-amino-1MQ in rat plasma and applied it to single-dose oral and intravenous pharmacokinetic studies. Reported parameters in rats include oral bioavailability of approximately 40% and an elimination half-life of approximately 3 hours. No human pharmacokinetic data have been published. Allometric scaling from rat to human is not a substitute for dedicated human PK studies.

Routes used in mice for efficacy work include oral gavage at 20 mg/kg [neelakantan2017_obesity] and (in the older literature on the methyl-quinolinium series) intraperitoneal administration. Tissue distribution, plasma protein binding, metabolism, and elimination pathways have not been characterized in humans.

Pharmacodynamics

Pharmacodynamic readouts in mice include lower 1-methylnicotinamide formation in adipose tissue and liver, lowered body weight on high-fat diet, reduced adipose mass, and improved glucose tolerance over multi-week dosing [neelakantan2017_obesity, babula2024]. NNMT-knockout phenotypes [brachs2019, kraus2014] are directionally consistent with the small-molecule pharmacology.

No human pharmacodynamic data have been published for 5-amino-1MQ.

Comparing 5-Amino 1MQ Formulations

There are no approved or compounded comparator formulations of 5-amino-1MQ. The molecule has no FDA-approved drug product, no compendial monograph, and is not on the FDA 503A bulks list [fda503a; fda_503a_bulks]. Material sold through unregulated channels is laboratory-grade reagent and is not a comparator for a regulated medicine.

5-Amino 1MQ Storage and Handling

Storage recommendations for 5-amino-1MQ are not standardized because the molecule is not a regulated pharmaceutical product. Research-grade material is typically stored at -20 °C as a solid by laboratory convention, but this is not a pharmaceutical specification.

5-Amino 1MQ Compounding & Operations

503A compounding

Physicians may submit patient-specific prescription requests for pharmacy review. For 5-Amino 1MQ, certain preparations may be available now when clinically appropriate, lawfully prescribed, and approved by the dispensing pharmacy. Availability is determined case by case and may depend on patient-specific documentation, ingredient status, source qualification, formulation feasibility, state requirements, and pharmacist judgment. The review starts with the evidence constraint: The evidence base for 5-Amino 1MQ is primarily preclinical. Published work centers on NNMT inhibition, adipose biology, and metabolic models, without an FDA-approved product or a mature human efficacy and safety program.

This ingredient is part of an evolving FDA review process. RonanRx is monitoring FDA's PCAC process and any subsequent agency action. This ingredient is part of an evolving FDA review process for bulk substances used in compounding. Availability may change after FDA review, PCAC discussion, final agency action, or state-board guidance. For 5-Amino 1MQ, RonanRx ties that monitoring to the evidence limits described above and to any patient-specific documentation submitted by the prescriber.

Valid patient-specific prescription required. Supporting clinical rationale may be requested. Compounded medications are not FDA-approved. No consumer self-ordering, no office stock, no bulk dispensing. Requests for 5-Amino 1MQ are reviewed before any preparation is made or released. A physician-submitted request keeps 5-Amino 1MQ out of the consumer research-chemical lane and forces the practical questions: what is the patient-specific rationale, what source can be verified, what formulation is feasible, and whether a pharmacist can release it.

Pharmacist review

For 5-Amino 1MQ, the pharmacist review starts before any preparation is made. Valid patient-specific prescription required. Supporting clinical rationale may be requested. The pharmacist reviews ingredient status, sourcing, formulation feasibility, state requirements, patient-specific documentation, and whether dispensing is appropriate case by case.

Quality and traceability

If a 5-Amino 1MQ preparation is approved after pharmacy review, RonanRx applies source documentation, formulation records, lot traceability, release checks, and storage controls appropriate to the actual dosage form. Research-use vial storage practices do not substitute for pharmacy-assigned storage, beyond-use dating, sterility controls when applicable, or recallable batch records.

Cold chain

If a 5-Amino 1MQ preparation is approved after pharmacy review, RonanRx applies source documentation, formulation records, lot traceability, release checks, and storage controls appropriate to the actual dosage form. Research-use vial storage practices do not substitute for pharmacy-assigned storage, beyond-use dating, sterility controls when applicable, or recallable batch records.

Frequently Asked Questions About 5-Amino 1MQ

Can physicians request 5-Amino 1MQ through RonanRx?

Physicians may submit patient-specific prescription requests for pharmacy review. Certain preparations may be available now when clinically appropriate, lawfully prescribed, and approved by the dispensing pharmacy. Availability is determined case by case. Compounded medications are not FDA-approved, and no consumer self-ordering, office stock, or bulk dispensing is offered.

Is 5-amino-1MQ a peptide?

No. Despite frequently being marketed as a 'longevity peptide,' 5-amino-1MQ (5-amino-1-methylquinolinium) is a small molecule, a methylated quinolinium scaffold designed as a substrate-mimic inhibitor of the enzyme NNMT [neelakantan2017_sar].

Is 5-amino-1MQ FDA-approved?

No. 5-amino-1MQ has never been the subject of an FDA-approved drug application and has not entered an FDA-cleared investigational new drug (IND) program at the time of this review. The 2026 Trends in Pharmacological Sciences review of the NNMT inhibitor field frames the entire class as preclinical, with no asset having reached human trials [puleo2026].

What evidence exists for 5-amino-1MQ?

Entirely preclinical. In vitro enzymatic and cellular work establishes the methyl-quinolinium series as cellular-permeable NNMT inhibitors [neelakantan2017_sar]. Mouse work reports reversal of high-fat-diet-induced obesity at 20 mg/kg oral dosing [neelakantan2017_obesity]. Rat pharmacokinetics report approximately 40% oral bioavailability and a 3-hour elimination half-life [awosemo2021]. No human pharmacokinetic, safety, or efficacy data have been published.

What about the ovarian cancer research with NNMT?

Eckert et al. 2019 in Nature identified NNMT as a master metabolic regulator of cancer-associated fibroblasts in ovarian carcinoma and showed that NNMT inhibition reversed fibroblast-driven tumor phenotypes in patient-derived xenograft models [eckert2019]. This is preclinical stromal biology, not a clinical trial. No NNMT inhibitor has entered human cancer trials at the time of this review [puleo2026].

Is it safe?

Unknown in humans. No published human safety data exist for 5-amino-1MQ. Rodent studies have not characterized formal toxicology, genotoxicity, or reproductive endpoints in a way that would support an IND. Material sold through unregulated channels is laboratory-grade reagent without pharmaceutical-grade identity, purity, sterility, or endotoxin controls [puleo2026; fda503a].

Can physicians request 5-Amino 1MQ through RonanRx?

Physicians may submit patient-specific prescription requests for pharmacy review. Certain preparations may be available now when clinically appropriate, lawfully prescribed, and approved by the dispensing pharmacy. Availability is determined case by case. Compounded medications are not FDA-approved, and no consumer self-ordering, office stock, or bulk dispensing is offered.

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How to Access 5-Amino 1MQ

Compounded 5-Amino 1MQ is dispensed under 503A on a patient-specific prescription. Depending on your role, the next step looks different.

FOR PRESCRIBING CLINICIANS

Offer this medication

A pharmacist will follow up within two business days. We'll cover state availability, supported formulations, and what integration looks like for your clinic.

ronanrx.com/request-partnership-call

PATIENT WITH A DOCTOR

Receive your prescription

If your doctor has prescribed 5-Amino 1MQ, sign up so we can prepare and ship your medication. The signup wizard collects intake and connects you to the prescribing workflow.

ronanrx.com/patients

PATIENT WITHOUT A DOCTOR

Find a partner clinic

RonanRx prescribes through partner clinics — we don't initiate prescriptions on this site. Read how the referral process works and how to find a partner clinic in your state.

ronanrx.com/find-clinic

Other compounds RonanRx makes

This monograph is one of many in the RonanRx formulary. Every compound below is prepared under 503A on a patient-specific prescription. Browse the full catalog at ronanrx.com/medications and ronanrx.com/peptides, or scan the codes at right for each index.

Medications

Peptides

MEDICATIONS (40)

Alpha-Lipoic Acid (ALA) — Antioxidant & mitochondrial
Coenzyme Q10 (CoQ10) — Antioxidant & mitochondrial
Glutathione — Antioxidant & mitochondrial
NAD+ / NMN — Antioxidant & mitochondrial
Compounded Topical Anesthetics (BLT, LET) — Dermatology
Topical Minoxidil — Dermatology
Topical Tretinoin — Dermatology
Compounded Magnesium — Energy & nutritional
Cyanocobalamin — Energy & nutritional
High-Dose Vitamin D — Energy & nutritional
Hydroxocobalamin — Energy & nutritional
Iron (Compounded) — Energy & nutritional
L-Carnitine — Energy & nutritional
Methylcobalamin (B12) — Energy & nutritional
Methylfolate — Energy & nutritional
Anastrozole — Hormone optimization
Clomiphene & Enclomiphene — Hormone optimization
DHEA — Hormone optimization
Estradiol — Hormone optimization
Estriol — Hormone optimization
Human Chorionic Gonadotropin (HCG) — Hormone optimization
Pregnenolone — Hormone optimization
Progesterone — Hormone optimization
Testosterone — Hormone optimization
Compounded Metformin — Metabolic & weight
Compounded Semaglutide — Metabolic & weight
Compounded Tirzepatide — Metabolic & weight
Lipotropic Injection (MIC, MICC) — Metabolic & weight
Low-Dose Naltrexone (LDN) — Metabolic & weight
Naltrexone-Bupropion Combination — Metabolic & weight
Topiramate — Metabolic & weight
Bremelanotide / PT-141 — Sexual health
Compounded Sildenafil — Sexual health
Compounded Tadalafil — Sexual health
Trimix Injection — Sexual health
Compounded Gabapentin — Sleep & recovery
Compounded Melatonin — Sleep & recovery
Compounded T3 (Liothyronine) — Thyroid
Compounded T3/T4 Combinations — Thyroid
Compounded T4 (Levothyroxine) — Thyroid

PEPTIDES (21)

Sermorelin — Available now

Tesamorelin — Available now

AOD-9604 — Growth-hormone axis (under FDA review)

CJC-1295 — Growth-hormone axis (under FDA review)

GHRP-2 / GHRP-6 — Growth-hormone axis (under FDA review)

Hexarelin — Growth-hormone axis (under FDA review)

Ipamorelin — Growth-hormone axis (under FDA review)

MK-677 / Ibutamoren — Growth-hormone axis (under FDA review)

5-Amino 1MQ — Metabolic & longevity (under FDA review)

Epitalon / Epithalon — Metabolic & longevity (under FDA review)

MOTS-C — Metabolic & longevity (under FDA review)

Thymosin Alpha-1 / Thymalin — Metabolic & longevity (under FDA review)

DSIP, Delta Sleep-Inducing Peptide — Neuro & cognitive (under FDA review)

Selank — Neuro & cognitive (under FDA review)

Semax — Neuro & cognitive (under FDA review)

Vasoactive Intestinal Peptide (VIP) — Neuro & cognitive (under FDA review)

BPC-157 — Tissue repair (under FDA review)

KPV — Tissue repair (under FDA review)

LL-37 — Tissue repair (under FDA review)

Pentadeca Arginate (PDA) — Tissue repair (under FDA review)

TB-500 / Thymosin Beta-4 — Tissue repair (under FDA review)