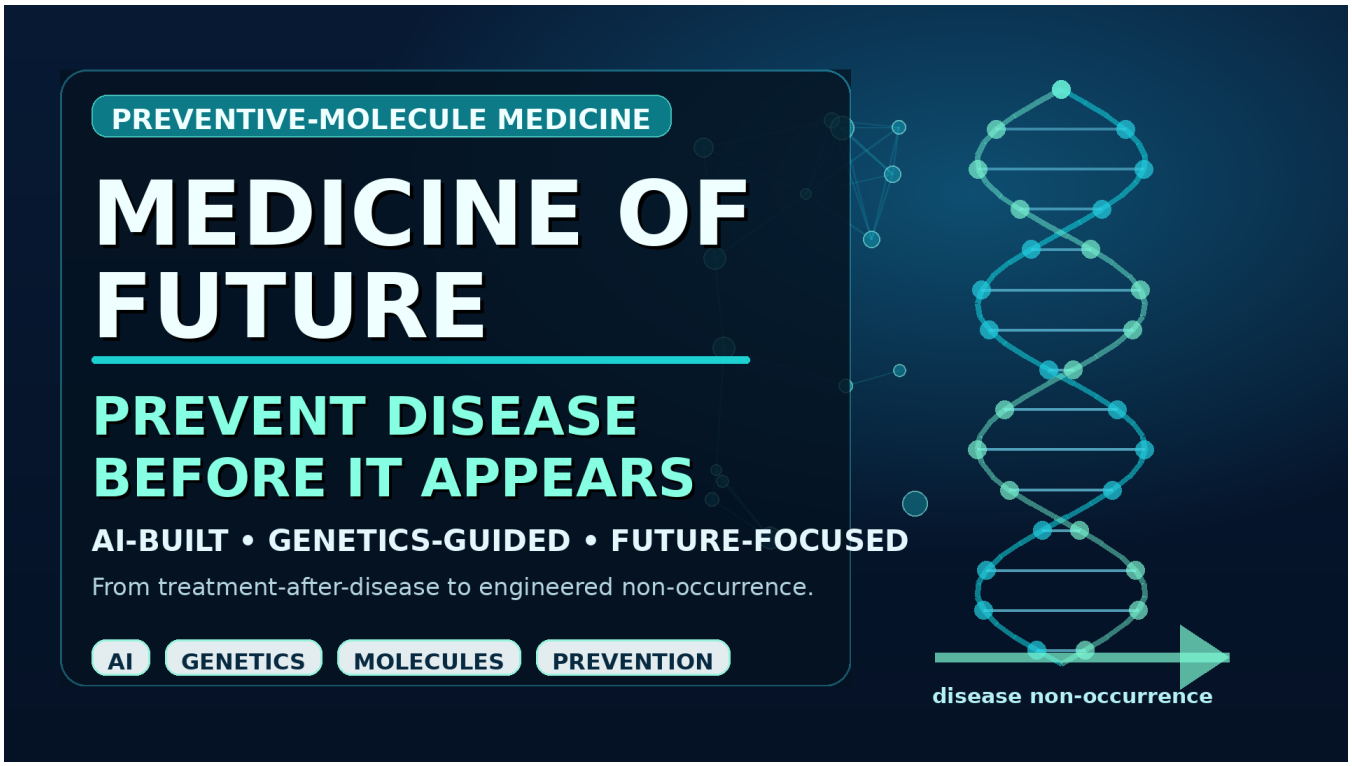

Medicine of Tomorrow
Medicine of Future

A Preventive-Molecule, Genetics-Guided, AI-Built Medical Paradigm

From medicine that financially lives after disease appears to medicine scientifically designed to prevent disease from appearing.

Lev Neymotin, PhD
N5Digital / Uncompressed Thinking

Position Paper

Date of draft: July 10, 2026

Table of Contents

Preamble

The medical world of today is focused almost completely on treating diseases while paying only lip service to prevention. This statement is intentionally strong because the present medical system is itself strong in the wrong place. It is brilliant after catastrophe. It is enormously sophisticated after pathology declares itself. It can replace joints, open arteries, transplant organs, image tumors, deliver biologic drugs, and maintain life in intensive care. But its central economic and professional center of gravity still appears after disease is already present.

Being on the cynical side, and accepting the standard economic model of medicine as a business, the more diseases and medical problems we have, the higher is the cash flow into the field of medicine. This does not mean that doctors want people to be sick. It means that the machinery of payment, investment, prestige, infrastructure, insurance, medical education, and pharmaceutical markets is largely arranged around the diagnosis, treatment, monitoring, and long-term management of disease. The sick body becomes the economic event.

This applies both to the entire medical care system and to the pharmaceutical industry tightly connected to it. Another component is medical research and development, which develops newer and newer, more and more sophisticated, and therefore more and more expensive methods and gadgets, including imaging technologies. These tools are often remarkable and lifesaving. The problem is not their existence. The problem is that most of them are focused on treatment, rescue, and chronic management, not on preventing the disease from appearing in the first place.

Each of these components feeds on the others. More disease supports more medical services. More services support more infrastructure. More infrastructure supports more expensive training, equipment, billing, insurance, regulation, and research. New technologies create new possibilities and also new spending. New diagnoses create new markets. New markets create new products. The result is a vicious circle of run-away action, blowing up the medical budget of a country to the limits of unsustainability. In the United States, national health expenditure reached $5.3 trillion in 2024, or 18.0 percent of GDP, according to CMS; the CDC states that chronic and mental health conditions account for 90 percent of the nation's annual health care expenditures [1,2].

My position is that the base of the Medicine of Tomorrow - the Medicine of Future - should be prevention, while obviously maintaining its curative function. Curative medicine must remain. Trauma, infection, genetic accidents, environmental disasters, stochastic biology, aging, and human suffering will not disappear. But the center of medicine must move. The hospital should become the emergency fallback, not the cathedral of the whole medical civilization. The main glory of medicine should not be how much disease it treats, but how much disease it prevents from ever becoming real.

The most important new center of this medicine will not be general wellness language alone. Eating unprocessed foods, healthy diets, regular exercise, personal and societal hygiene, vaccination, and sane lifestyles will all remain important. But the new scientific base should be much more ambitious: the development of preventive molecules - one molecule, or a soup of a few molecules, designed specifically to prevent each individual disease or disease family before it starts. These molecules should be prescribed not randomly, but based on genetic makeup, family history, biomarkers, exposures, and new methods for identifying the potential future development of specific diseases.

In this future, the question is not only: what drug treats established diabetes, cancer, heart disease, Alzheimer's disease, autoimmune disease, or severe infection? The question becomes: what molecule, molecule combination, or biological intervention can keep the pre-disease trajectory from crossing into disease? This is the futuristic, almost science-fiction part of the vision. But it is not empty fantasy. Medicine already uses preventive molecules today: vaccines, folic acid to prevent neural tube defects, statins for primary prevention in selected cardiovascular-risk groups, medications to reduce breast-cancer risk in selected high-risk women, PrEP to prevent HIV infection, long-acting antibodies to prevent RSV disease in infants, and semaglutide now

approved to reduce major cardiovascular events in adults with cardiovascular disease and overweight or obesity [5-11].

The enclosed HelixBridge concept should be mentioned as one early example of this upstream philosophy. It is not the whole concept of Medicine of Future. It is a first gate: voluntary preconception genetic screening to identify serious inherited reproductive risks before pregnancy, before late prenatal diagnosis, and before the birth of an affected child when earlier prevention would have been possible [24].

The Medicine of Tomorrow will be developed with monumental input from artificial intelligence. AI will not be merely a software gadget in the clinic. It will become the engine for discovering disease-origin pathways, designing preventive molecules, selecting molecule combinations, simulating long-term risk, identifying disease before symptoms, and continuously adjusting prevention to the individual. The result will reshape the entire medical field: medical personnel, training, specialties, services, hospitals, pharmaceutical R&D, devices, imaging, insurance, and the entire industrial infrastructure presently built around disease treatment.

This paper presents that concept in full scope. It intentionally preserves the direct language of the thesis: the present system is too disease-centered, too treatment-centered, too financially comfortable with disease, and too weakly committed to prevention. It then expands the thesis into a scientific, economic, ethical, and implementation framework.

Executive Summary

Medicine of Tomorrow, or Medicine of Future, is proposed as a heavily preventative medical paradigm whose central objective is to minimize the probability of occurrence and development of diseases and ailments. It does not abolish curative medicine. It relocates curative medicine to its proper role: rescue, repair, palliation, and treatment when prevention is impossible, incomplete, or has failed.

The present system is dominated by treatment. It is excellent at many forms of treatment, but it is economically, institutionally, and professionally organized around disease after it appears. Hospitals, specialist procedures, imaging technologies, chronic drug markets, medical devices, and expensive care episodes generate the largest cash flows. This creates a vicious circle in which disease burden, medical infrastructure, pharmaceutical development, imaging, procedures, insurance, and R&D reinforce one another. The global and U.S. burden of chronic disease makes this circle unsustainable: WHO identifies noncommunicable diseases as major drivers of death and health-system stress, with tobacco use, physical inactivity, harmful alcohol use, unhealthy diets, and air pollution among shared risk factors [3].

The proposed answer is not merely more advice to eat better and exercise. Those measures remain necessary, but they are not enough to define the future of medicine. The real transformation is a new R&D civilization organized around preventive molecules. A preventive molecule is a drug, biologic, antibody, vaccine, small molecule, peptide, nucleic-acid tool, microbiome-derived compound, metabolite, or other molecular intervention used before clinical disease to reduce the probability that disease will arise, progress, or become irreversible.

The phrase "one molecule or a soup of few molecules for each disease" is used deliberately. It describes the desired end state: disease-specific molecular prevention packages, built from deep knowledge of disease origination and development. For coronary artery disease, the package may include lipid, metabolic, inflammatory, thrombosis, and obesity-linked interventions. For cancer, it may include hormone modulation, immune surveillance, DNA-repair protection, antiviral vaccination, microbiome control, and early cellular interception. For neurodegeneration, it may include anti-misfolding, anti-inflammatory, vascular, metabolic, mitochondrial, synaptic, and clearance-pathway interventions. For infection, it may include vaccines, monoclonal antibodies, antiviral prophylaxis, and immune-training strategies.

This vision is futuristic, but its foundation already exists. Vaccines are the most powerful historical example of molecular prevention, with WHO stating that immunization prevents 3.5 million to 5 million deaths every year [11]. USPSTF recommends statins for primary prevention in selected adults at elevated cardiovascular risk [5].

USPSTF recommends risk-reducing medications such as tamoxifen, raloxifene, or aromatase inhibitors for selected women at increased breast cancer risk and low risk of medication harms [6]. CDC defines PrEP as antiretroviral medication used by HIV-negative people to prevent HIV infection [7]. FDA approved nirsevimab to prevent RSV lower respiratory tract disease in infants and vulnerable toddlers [8]. FDA approved semaglutide to reduce the risk of serious heart problems in adults with cardiovascular disease and obesity or overweight [9]. USPSTF recommends folic acid supplementation before and early in pregnancy to prevent neural tube defects [10]. These are not science fiction. They are early ancestors of the preventive-molecule medicine envisioned here.

The second base is genetics and family history. Each person should eventually have a personal disease-risk map, built from family history, genetic makeup, pharmacogenomics, polygenic risk where validated, biomarkers, environment, lifestyle, and longitudinal measurements. This map will not be destiny. It will be a targeting system. It will answer the question: which diseases is this person most likely to develop, through which biological routes, during which life windows, and which preventive molecules or combinations are scientifically justified?

The third base is voluntary preconception genetic screening. The HelixBridge proposal is referenced only briefly in this paper, because it is one important example rather than the whole future model. It proposes a consent-based preconception and premarital genetic compatibility screening service that uses genetic-origin profiling, carrier charts, and couple compatibility advice to identify severe inherited reproductive risks before pregnancy [24].

The fourth base is AI. AI will be the monumental accelerator of Medicine of Future. It can integrate genomics, family history, biomarker dynamics, imaging, EHR data, pharmacogenomics, exposome data, and scientific literature. It can help discover targets, design molecules, simulate disease trajectories, identify the preclinical window, select preventive combinations, and monitor safety over decades. AI is already recognized by FDA as relevant across drug development, and the AlphaFold Protein Structure Database provides open access to over 200 million protein structure predictions, showing the scale of AI-enabled biological acceleration [12,14].

The economic logic must change. A system paid mainly for illness will always remain biased toward illness. Medicine of Future should pay for avoided disease, delayed disease, lower risk trajectories, preserved organ function, fewer hospitalizations, fewer late-stage procedures, and longer healthy life. This does not require the naive claim that all prevention saves money. Classic health-economic work warns that prevention can be valuable without always saving money [4]. The stronger argument is that a civilization cannot endlessly expand treatment complexity as its dominant response to disease.

The result will reshape the medical field. Medical personnel will not simply disappear, but their structure will change. Some downstream services may shrink if disease burden is reduced. New roles will expand: prevention physicians, preventive pharmacologists, genomic-risk physicians, AI-health engineers, disease-origin scientists, prevention-trial designers, molecular-safety monitors, family-risk counselors, and health-system economists. Medical education will move upstream from pathology recognition to disease-origin engineering.

Medicine of Future is therefore not a wellness movement. It is a scientific-industrial redirection of medicine from treatment-after-disease to engineered non-occurrence of disease.

1. The Central Position

The central position of this paper is simple: the base of the Medicine of Tomorrow should be prevention. Not prevention as lip service. Not prevention as a brochure in the waiting room. Not prevention as a yearly reminder to lose weight. Prevention should become the organizing principle of medical science, medical R&D, medical economics, medical education, and medical industry.

The key change is the change of the question. Present medicine usually asks: What is the diagnosis? What is the treatment? What drug, operation, scan, or procedure is now indicated? The Medicine of Future asks an earlier

question: Why should this disease be allowed to appear in the first place if we can identify its origin and interrupt its development?

The main objective is to minimize probability of occurrence and development of disease. This is an ideal objective. It will not be completely reached, because biology is not completely controllable. But medicine is built on ideals that drive practical progress. Surgery pursues sterility knowing infection still occurs. Oncology pursues remission knowing recurrence still occurs. The Medicine of Future pursues non-occurrence knowing that disease will never be fully abolished.

The position has three practical pillars:

1. Preventive molecules designed disease-by-disease, and eventually person-by-person, to reduce the probability that known diseases will arise or progress.
2. Genetic and family-history screening, including brief incorporation of preconception screening, to determine which disease trajectories are most relevant for a given individual or couple.
3. Artificial intelligence as the great accelerator for discovering disease-origin mechanisms, designing preventive molecules, selecting molecule combinations, and monitoring long-term safety.

Traditional prevention - unprocessed foods, healthy diets, regular exercise, personal hygiene, societal hygiene, vaccination, clean water, and public-health measures - remains necessary. But these are not enough to carry the entire future. The decisive expansion is molecular prevention: scientifically designed interventions before disease.

This paper therefore uses a deliberately futuristic phrase: preventive-molecule medicine. It means a medicine in which the first major pharmaceutical question is no longer "what can treat a disease after diagnosis?" but "what can prevent this disease from becoming diagnosable?"

2. The Present Medical Economy: A Vicious Circle Around Disease

The present medical system contains good people and powerful science, but it is trapped in a business structure where disease is the main revenue event. Illness activates billing. Illness activates hospitalization. Illness activates procedures, scans, prescriptions, laboratories, insurance payments, disability programs, home-care services, and long-term pharmaceutical consumption. The more complex the disease, the larger the economic chain.

This does not require a conspiracy theory. It is a system-design problem. Hospitals need full beds and procedure volume. Imaging centers need scans. Device companies need device utilization. Pharmaceutical companies need drug markets. Insurers price risk. Medical schools train specialists around disease categories. Journals publish treatment advances. Investors look for markets. A disease becomes not only a biological event, but an economic ecosystem.

The R&D side is part of this circle. Enormous scientific creativity is directed toward new treatment platforms, more specialized biologics, new imaging, complex devices, robotic procedures, late-stage cancer therapy, expensive rare-disease treatments, chronic disease management, and monitoring technologies. Many of these advances are valuable. Many save lives. But they also tend to arrive after disease is present. They improve treatment power while leaving the larger disease-producing pipeline intact.

The effect is run-away action. More disease creates more infrastructure. More infrastructure requires more money. More money creates more market demand for innovations that can justify higher prices. Higher prices require greater insurance and public spending. The system then becomes too economically dependent on disease to be naturally self-correcting.

The budget figures support the urgency of the concern. CMS reports that U.S. national health expenditure reached $5.3 trillion in 2024, or 18.0 percent of GDP [1]. CDC reports that 90 percent of the nation's annual health care expenditures are for people with chronic and mental health conditions [2]. WHO identifies

noncommunicable diseases as a massive global burden and lists shared modifiable risk factors such as tobacco use, physical inactivity, harmful alcohol use, unhealthy diets, and air pollution [3].

These facts do not prove that every medical actor is cynical. They prove that the present system is not structurally designed to make disease rare. Medicine of Future must be designed around the opposite economic signal: disease prevented, disease delayed, disease softened, disease never activated as a costly medical event.

A medical civilization should not celebrate the endless sophistication of rescue while neglecting the science of non-occurrence. The goal is not to destroy curative medicine. The goal is to reduce the need for it.

3. What Prevention Means in the Medicine of Future

Prevention in this paper is not a small add-on to treatment. It is not just screening. It is not simply early diagnosis. It is not only diet and exercise. It is the deliberate scientific effort to keep a disease trajectory from crossing the line into disease.

Medicine of Future separates prevention into several levels:

Level	Meaning	Example
Classical public prevention	Population measures that reduce exposure to disease causes.	Vaccination, sanitation, clean water, food safety, air-quality control.
Behavioral and lifestyle prevention	Daily behaviors that reduce risk burden.	Unprocessed foods, healthy diet patterns, exercise, sleep, avoidance of tobacco and harmful alcohol.
Genetic and family-risk prevention	Identification of inherited or familial disease risk before disease.	Carrier screening, family-history maps, pharmacogenomics, validated polygenic risk scores.
Molecular prevention	Drug, biologic, vaccine, antibody, peptide, RNA, metabolite, or small-molecule intervention given before clinical disease.	Statins for selected cardiovascular-risk groups, PrEP for HIV, nirsevimab for RSV, folic acid for neural-tube-defect prevention.
Disease-interception prevention	Treatment of a pre-disease biological process before irreversible pathology.	Future anti-cancer initiation blockers, anti-misfolding molecules, immune tolerance induction, early vascular plaque stabilization.
Personal AI-guided prevention	Continuous adjustment of prevention based on individual risk and response.	A personal disease-risk map that recommends and updates preventive molecule packages.

The central scientific expansion is from general prevention to disease-specific molecular prevention. In this view, each major disease should eventually have a prevention protocol analogous to a treatment protocol. The difference is timing. Instead of waiting for tissue damage, organ failure, malignancy, infection, or neurodegeneration, the protocol acts earlier.

The phrase "preventive molecule" must be understood broadly. A vaccine is a preventive molecule system. Folic acid is a small-molecule nutritional preventive intervention. A statin is a preventive pharmacological intervention in selected risk groups. A monoclonal antibody can be used preventively, as with RSV protection in infants. An antiviral PrEP drug prevents infection. A metabolic drug can reduce cardiovascular events in a population at risk. Future molecules may include RNA medicines, targeted immune modulators, anti-senescence agents, microbiome-derived products, protein-stabilizing molecules, epigenetic stabilizers, anti-inflammatory calibrators, and programmed multi-molecule regimens.

The Medicine of Future should therefore not be afraid of sounding futuristic. The future is not "take a walk and eat vegetables" alone. That is useful but insufficient. The future is the identification of disease-origin mechanisms and the design of molecular shields against them.

4. Preventive Molecules as the New Core of Medical R&D

The center of medical R&D must shift from treatment molecules to preventive molecules. The current pharmaceutical model often asks: How can we treat the patient after the disease has produced symptoms, a diagnosis, or measurable damage? The Medicine of Future asks: What molecule can be given earlier, in a precisely selected population, to prevent the disease from ever expressing itself clinically?

A preventive molecule can be defined as follows:

> *A preventive molecule is a scientifically validated molecular intervention prescribed before clinical disease, or before irreversible disease progression, to reduce the probability, delay the onset, lower the severity, or block the development of a specific disease in a specific risk-defined person or population.*

This definition includes vaccines and classical preventive medications, but it extends beyond them. The target is not merely to prevent infections. It is to prevent cardiovascular disease, cancer, diabetes, autoimmune disease, neurodegeneration, organ failure, infertility, inherited disease expression where possible, severe pregnancy complications, and aging-related collapse of function.

The phrase "one molecule or a soup of a few molecules" should be understood as the future practical architecture. Many diseases are not single-cause events. Coronary artery disease is not only cholesterol. Cancer is not only mutation. Alzheimer's disease is not only one protein. Autoimmune disease is not only one immune switch. Therefore a preventive protocol may require a carefully selected combination: one molecule to reduce the initiating risk, a second to stabilize tissue, a third to modulate immune or metabolic response, and a fourth used only in certain genotypes or family-history profiles.

The pharmaceutical industry already understands combination treatment in oncology, HIV, hypertension, diabetes, and other areas. The Medicine of Future extends the combination idea upstream: combination prevention before disease.

The new R&D question for every major disease should be structured as follows:

4. What is the earliest biological origin of this disease?
5. What genetic, family-history, biomarker, imaging, or exposure pattern identifies a person at high probability before symptoms?
6. What molecular pathways can be safely modified before disease without causing unacceptable harm?
7. Is one preventive molecule enough, or is a small cocktail required?
8. Which genetic or pharmacogenomic factors determine efficacy, toxicity, or dose?
9. What is the right age or life-window for intervention?
10. What long-term surveillance is needed to avoid trading one future disease for another?

This is a more difficult form of drug development than treating advanced disease. Prevention drugs must be safer because they may be used in people who are not yet sick. They require longer follow-up and more precise risk selection. But AI, biomarkers, organoids, digital twins, structural biology, pharmacogenomics, and longitudinal data can make this kind of development increasingly practical.

5. Scientific Proof That Preventive Molecules Are Not Fantasy

The concept sounds futuristic, and it should. But it is not without scientific ancestors. Medicine already contains multiple categories of molecules used before disease or before severe disease progression. These examples substantiate the basic idea that molecules can be designed, selected, or prescribed for prevention.

Current example	Preventive logic	Why it matters for Medicine of Future
Vaccines	Train immune protection before infection or severe infection.	WHO states that immunization prevents 3.5 million to 5 million deaths every year [11]. This is the

		strongest historical proof that molecular prevention can reshape civilization.
Folic acid	A small molecule taken before and early in pregnancy to reduce neural tube defects.	USPSTF recommends 0.4 to 0.8 mg daily for persons planning or capable of pregnancy [10]. This is prevention before an irreversible developmental event.
Statins	Reduce cardiovascular risk in selected adults before first cardiovascular events.	USPSTF recommends statins for selected adults aged 40 to 75 with risk factors and sufficient estimated 10-year CVD risk [5].
Breast cancer risk-reducing medications	Hormone-pathway modulation in selected high-risk women.	USPSTF recommends offering tamoxifen, raloxifene, or aromatase inhibitors to selected women at increased breast cancer risk and low adverse-effect risk [6].
HIV PrEP	Antiretroviral drug exposure before HIV exposure becomes infection.	CDC defines PrEP as antiretroviral medication to prevent HIV in HIV-negative people who may be exposed [7].
Nirsevimab	Long-acting monoclonal antibody protection before severe RSV disease.	FDA approved nirsevimab for prevention of RSV lower respiratory tract disease in neonates, infants, and selected vulnerable toddlers [8].
Semaglutide cardiovascular-risk indication	Metabolic molecule used to reduce major cardiovascular events in adults with CVD and overweight or obesity.	FDA approved Wegovy to help prevent life-threatening cardiovascular events in that high-risk population [9].

These examples are imperfect and limited. They do not yet amount to a full disease-by-disease molecular prevention system. But they show that the principle is real. The barrier is not conceptual. The barrier is scale, precision, safety, and economic alignment.

The future direction is to move from scattered preventive molecules to systematic preventive-molecule R&D. Every major disease should have a prevention-development program. Every program should begin with disease-origin science, then risk identification, then molecule design, then risk-selected trials, then AI-guided long-term monitoring.

This is where science fiction becomes scientific planning. The Medicine of Future should imagine a shelf not of treatments for established disease, but of disease-specific prevention kits. A person with a family history and genetic risk for early coronary disease may receive a vascular prevention package decades before an infarct. A person with high genetic and biomarker risk for a specific cancer pathway may receive a cancer-initiation prevention package before malignant transformation. A person with early neurodegenerative signatures may receive a molecule cocktail to stabilize proteins, mitochondria, inflammation, and vascular flow before memory loss. This should be the ambition.

The ambition must be paired with humility. Preventive molecules must be tested more carefully than many treatment drugs because the recipient may feel healthy. Safety, reversibility, consent, equity, and long-term monitoring are not bureaucratic afterthoughts. They are essential to the legitimacy of the entire project.

6. From Family History and Genetics to a Personal Disease-Risk Map

Preventive molecules cannot be prescribed to everyone without discrimination. That would create overmedication, toxicity, cost explosion, anxiety, and false certainty. The Medicine of Future requires a personal disease-risk map.

This map begins with what medicine has always had but often underuses: family history. Family history is a condensed record of inherited susceptibility, shared environment, culture, exposures, and behavior. It points to diseases that repeat across generations and to ages at which disease appears. In the Medicine of Future, family history is not a form completed once and forgotten. It is a living map that updates as relatives age, receive diagnoses, or die.

The second layer is genetic makeup. Some genetic information identifies high-risk single-gene disorders. Some affects drug response and adverse reactions. Some contributes probabilistically through many variants, as in polygenic risk scores. NHGRI describes polygenic risk scores as a way to learn about disease risk based on multiple genetic changes, while also noting that disease risk is often coupled with environmental factors [23].

The third layer is pharmacogenomics. FDA maintains a table of pharmacogenomic biomarkers in drug labeling, and NHGRI explains that pharmacogenomic testing can determine whether a person has genomic variants that affect medication response [21,22]. In the Medicine of Future, pharmacogenomics will not only be used to choose treatment after disease. It will be used to select preventive molecules safely: who should receive them, at what dose, for how long, and with what monitoring.

The fourth layer is biomarkers and early detection. These may include blood proteins, metabolites, inflammatory signatures, microbiome signals, epigenetic age markers, cell-free DNA, imaging signatures, wearable signals, sleep data, blood pressure, glucose patterns, lipid fractions, organ-function markers, and environmental exposures. The goal is not to collect infinite data. The goal is to identify the disease trajectory before it becomes clinically visible.

The fifth layer is environment and behavior. The same genotype may produce different disease probabilities depending on diet, exercise, toxins, infection history, stress, sleep, air quality, work exposure, and social conditions. The Medicine of Future therefore cannot be purely genetic. It must be gene-plus-family-history-plus-environment-plus-molecular-response.

The output should be a personal disease-risk map with four practical categories:

Risk category	Meaning	Action
High genetic/family-risk disease	A disease strongly suggested by family history, monogenic risk, or validated high-risk pattern.	Prioritize targeted screening, counseling, and preventive molecule evaluation.
High biomarker trajectory	A disease process may be starting biologically even without symptoms.	Confirm signal; evaluate disease-interception molecules or intensive lifestyle/environmental changes.
Modifiable exposure-driven risk	Disease probability is driven substantially by diet, toxins, activity, sleep, stress, infection, or environment.	Intervene through behavior, policy, and molecular prevention where justified.
Low-current-risk / monitor	No strong risk signal today.	Continue ordinary prevention and periodic reanalysis; avoid unnecessary molecular exposure.

In this system, genetics does not become destiny. Genetics becomes targeting. Family history does not become fear. It becomes a navigation map. Biomarkers do not become an anxiety machine. They become early warning signals only when they are actionable.

7. Preconception Genetic Screening as the First Upstream Gate

The voluntary preconception genetic screening concept discussed in the HelixBridge proposal is one early embodiment of the Medicine of Future. It is not the whole concept, and in this paper it should be mentioned briefly. Its significance is that it moves medicine upstream before pregnancy, before uncertainty, and before irreversible inherited disease in a future child.

HelixBridge is described as a voluntary, consent-based preconception and premarital genetic compatibility screening service. Its purpose is to identify high-risk reproductive genetic pairings before pregnancy, before late prenatal diagnosis, and before the birth of an affected child when earlier prevention would have been possible [24].

The basic HelixBridge logic has three stages: a genetic-origin and family-risk profile, a personal carrier chart, and couple compatibility advice based on the two partners' genetic findings. The service is not a designer-baby

program, not a tool for mate selection, not social ranking, and not a program to prevent carriers from reproducing. It is a medical prevention service for severe inherited reproductive risk [24].

This matters for the larger concept because it demonstrates an upstream medical logic. The target is not disease after it has appeared. The target is risk before irreversible harm. In reproductive genetics, the harm may be the birth of a child affected by a severe inherited disease that could have been anticipated. In adult medicine, the harm may be a heart attack, malignancy, autoimmune destruction, dementia, kidney failure, stroke, severe infection, or metabolic collapse that could have been delayed or prevented.

The Medicine of Future generalizes this upstream logic. It asks: if preconception genetic screening can identify inherited reproductive risk before pregnancy, why should similar upstream systems not identify coronary risk before infarct, cancer risk before malignant expansion, neurodegeneration risk before dementia, autoimmune risk before organ destruction, and metabolic risk before diabetes?

The important ethical boundary must be carried forward. Genetic screening must be voluntary, consent-based, privacy-protected, counseling-linked, clinically valid, and separated from enhancement, coercion, eugenics, discrimination, or social ranking. The purpose is prevention of severe disease and suffering, not the ranking of human beings.

8. AI as the Monumental Engine of the New Medicine

Artificial intelligence will be the monumental input into Medicine of Future. Without AI, the vision remains intellectually attractive but operationally impossible. No physician, no committee, and no traditional pharmaceutical research team can manually integrate the future scale of genomics, family histories, biomarkers, imaging, literature, molecular structures, drug interactions, lifestyle data, exposures, and long-term outcomes.

AI will have at least six central roles.

AI role	Function in Medicine of Future	Output
Disease-origin mapping	Integrate omics, pathology, longitudinal cohorts, and literature to identify earliest disease mechanisms.	Disease-origin maps and target pathways.
Preventive molecule design	Generate, screen, and optimize candidate molecules, biologics, antibodies, peptides, RNAs, and combinations.	Candidate preventive molecules and molecule soups.
Risk-personalization engine	Combine genetics, family history, pharmacogenomics, biomarkers, and exposures.	Personal disease-risk map and prevention priority list.
Digital trial simulation	Model long-term benefits and harms before large prevention trials.	Trial designs, risk-enrichment strategies, safety hypotheses.
Clinical decision support	Suggest prevention options, monitoring, contraindications, and alternative strategies.	Clinician-reviewed prevention prescription.
Learning health system	Continuously compare predicted risk, intervention, outcome, and adverse events.	Updated models and improved prevention protocols.

The feasibility of AI-assisted biological acceleration is already visible. FDA maintains resources on AI for drug development and has issued guidance on AI to support regulatory decision-making for drugs and biological products [12,13]. The AlphaFold Protein Structure Database provides open access to over 200 million protein structure predictions, an example of AI changing the scale of biological research [14]. WHO, NAM, FDA, and ONC have all moved toward governance principles for health AI, large multimodal models, AI-enabled medical devices, and algorithmic transparency [15-17,26].

In the futuristic version, AI will generate disease-origin atlases and preventive-molecule libraries. A person's risk map will be compared against these libraries. The result will be a prevention prescription: not one-size-fits-all, but disease-specific, genotype-aware, family-history-aware, biomarker-aware, and dynamically updated.

AI must not become the moral authority. It should design, calculate, compare, and warn. It should not coerce. High-stakes prevention decisions - especially those involving genetics, reproduction, long-term medication, cancer risk, psychiatric risk, or pediatric use - require human professional review and informed consent.

The Medicine of Future is therefore AI-built but human-governed.

9. The Disease-by-Disease Prevention Pipeline

The practical heart of the concept is a disease-by-disease prevention pipeline. Every major disease should be treated as an engineering problem of origin, probability, timing, and molecular interruption.

The pipeline should have eight steps:

- Define the disease precisely. Avoid broad labels when the biology is heterogeneous.
- Identify the origin pathways: genetic, inflammatory, metabolic, immune, vascular, infectious, toxic, hormonal, mitochondrial, microbiome, neuroendocrine, epigenetic, and environmental.
- Find the preclinical window - the time before symptoms when intervention is still likely to prevent or delay disease.
- Build the risk-selection model using family history, genetics, pharmacogenomics, biomarkers, environment, and exposures.
- Design one preventive molecule or a small molecule soup targeted to the origin pathway.
- Test the molecule or soup in high-risk, biomarker-defined, ethically consented populations.
- Monitor long-term safety, because preventive medicines require high safety standards.
- Feed outcomes back into AI models to improve targeting, dosing, combinations, and stopping rules.

The table below illustrates the future direction. It does not assert that all molecules listed are already approved for these preventive uses. It is an R&D map, not a prescribing table.

Disease family	Future prevention target	Possible preventive-molecule direction
Atherosclerotic cardiovascular disease	Plaque initiation, lipid burden, inflammation, thrombosis, obesity-linked risk.	Statins, PCSK9-pathway agents, anti-inflammatory candidates, GLP-1/GIP pathway drugs, future plaque-stabilizing molecules.
Type 2 diabetes and metabolic collapse	Insulin resistance, beta-cell stress, obesity, fatty liver, inflammation.	Metformin-like prevention, GLP-1/GIP agents, mitochondrial and hepatic-fat modulators, microbiome metabolites.
Cancer initiation	DNA damage, hormone stimulation, viral triggers, immune escape, pre-malignant clones.	Vaccines, endocrine risk reducers, immune-surveillance enhancers, clone-suppressing molecules, DNA-repair stabilizers.
Neurodegeneration	Protein misfolding, neuroinflammation, vascular injury, mitochondrial decline, synaptic loss.	Anti-misfolding molecules, microglial modulators, mitochondrial stabilizers, vascular protection packages.
Autoimmune disease	Immune misrecognition, barrier dysfunction, microbiome triggers, inflammatory memory.	Antigen-specific tolerance molecules, cytokine calibration, microbiome-derived metabolites, barrier repair molecules.
Infectious disease	Exposure, viral entry, immune vulnerability, pathogen replication.	Vaccines, PrEP, long-acting antibodies, entry inhibitors, immune-training molecules.
Pregnancy and developmental disorders	Nutritional deficiency, carrier-pair risk, placental dysfunction, maternal metabolic risk.	Folic acid, targeted supplementation, preconception genetics, future placental-protection molecules.
Aging-related frailty	Muscle loss, inflammation, mitochondrial dysfunction, senescence, endocrine decline.	Myostatin-pathway agents, senolytics/senomorphics, mitochondrial support molecules, anti-inflammatory calibration.

This pipeline is the opposite of the current default. Current R&D often waits for a market of sick patients. Future R&D should build markets around disease not occurring. The product is not only a pill. The product is preserved health.

10. Clinical Practice in the Medicine of Future

Clinical practice will change from episodic disease treatment to continuous disease-probability management. The central document in the patient record will not be only the problem list. It will be the disease-risk map.

The first visit in the Medicine of Future should not ask only, "What brings you here?" It should ask: "What diseases are trying to come here in the next ten, twenty, or thirty years, and what can be done now to prevent them?"

A future clinical workflow may include:

- A deep family-history and genetic-risk intake, updated over time.
- Pharmacogenomic screening when useful for choosing preventive molecules and avoiding harm.
- Validated polygenic risk where evidence supports use and where ancestry limitations are transparently handled.
- Longitudinal biomarkers for cardiovascular, metabolic, cancer, immune, neurodegenerative, renal, hepatic, reproductive, and functional risk.
- An AI-generated disease-risk map reviewed by clinicians.
- A prevention prescription that may include lifestyle, environment, screening, vaccination, and preventive molecules.
- Continuous monitoring of response, adverse effects, adherence, and changing science.

The clinician of the future will be less like a repair technician and more like a disease-trajectory engineer. The physician will still diagnose and treat. But the highest-value work will be to prevent the diagnosis from becoming necessary.

Preventive pharmacology will become a specialty. It will not be enough to know how to prescribe a drug for disease. The physician must know how to prescribe a molecule before disease, which is more ethically demanding. The risk-benefit calculation is different. The safety threshold is higher. The explanation to the patient must be clearer: "You are not sick now. We are treating a probability. Here is why that probability is high enough to justify this intervention."

Medical care will become more longitudinal. Five-minute visits cannot support this medicine. The system will need prevention teams: physicians, pharmacists, genetic counselors, molecular-risk specialists, AI safety officers, dietitians, exercise specialists, nurses, behavioral experts, and data monitors. The team exists not to process illness volume, but to keep illness volume from appearing.

11. Economic Redesign: Paying for Non-Occurrence of Disease

The economic model must change because the current model is built around cash flow after disease. A system that pays primarily for admissions, procedures, scans, chronic prescriptions, late-stage drugs, and complications will not naturally reorganize itself around absence of disease.

Medicine of Future requires payment for non-occurrence. This sounds strange because today we do not have good billing codes for "the heart attack that did not happen" or "the cancer that did not emerge" or "the inherited disease pairing discovered before pregnancy." But that is exactly the measurement problem that must be solved.

The new economic units should include:

- Disease avoided or delayed in risk-defined populations.
- Reduced transition from pre-disease to disease.

- Preserved organ function.
- Reduced hospitalization and emergency care for preventable conditions.
- Reduced need for late-stage procedures and expensive rescue therapy.
- Healthy life years, functional independence, and productive years preserved.
- Reduction in severe inherited disease risk through voluntary preconception screening and counseling.

This economic model must be honest. Prevention does not always save money in the short term, and sometimes it may not save money at all while still improving health. Cohen, Neumann, and Weinstein warned in NEJM that broad statements about prevention automatically saving money are overreaching [4]. The Medicine of Future should not depend on simplistic promises. Its economic argument is stronger: a country cannot sustainably build its medical future mainly around ever more expensive treatment after disease.

The investment target should therefore shift from late repair to early non-occurrence. Instead of paying more because disease became more complicated, society should pay for validated reduction in disease probability. This means new insurance models, long-term risk contracts, government prevention bonds, outcome-based reimbursement, and public-private R&D funds for preventive molecules.

The pharmaceutical industry can be part of this change. The industry should not be treated as an enemy. It should be redirected. The future market is not smaller medicine; it is different medicine. Companies can build profitable preventive-molecule platforms if payment systems reward disease avoided rather than only disease treated.

12. Transformation of Medical Education, Personnel, and Services

The Medicine of Future will reshape the structure of the medical field. This includes medical personnel, training, specialties, and types of services offered. The change should not be described only as reduction. It will be both reduction and transformation.

If severe disease occurrence decreases, some downstream services should decrease. Fewer advanced complications should mean fewer hospital beds for preventable disease, fewer amputations, fewer dialysis starts caused by preventable metabolic collapse, fewer emergency cardiovascular events, fewer late-stage cancers, fewer severe inherited disease births among screened and counseled populations, and fewer prolonged hospitalizations for preventable infections. That is exactly the goal.

At the same time, new services will expand. Medicine will need disease-origin scientists, preventive molecular pharmacologists, genetic-risk clinicians, AI-guided prevention teams, molecular-safety surveillance programs, long-term prevention-trial specialists, and educators who can explain probability-based medicine to the public.

Medical education should therefore be rewritten. The future curriculum must include:

- Disease-origin biology rather than only disease classification.
- Preventive pharmacology and molecular prevention trials.
- Genetics, pharmacogenomics, family-history interpretation, and ethical counseling.
- AI literacy, model limitations, algorithmic bias, and human oversight.
- Health economics of prevention and non-occurrence.
- Nutrition, exercise, sleep, hygiene, and environmental risk as scientific medicine, not soft advice.
- Communication of probability, uncertainty, residual risk, and preventive choices.

A future physician should be trained not only to identify disease but to identify the pre-disease trajectory. A future pharmacologist should not only ask how to treat disease but how to design molecules that prevent disease. A future radiologist should not only read images of established pathology but help define imaging signatures of future risk. A future medical school should produce not only treaters of disease, but architects of health preservation.

13. Transformation of the Medical Industry

The entire infrastructure of the medical industry and its associated fields will be affected. Hospitals, pharmaceutical companies, device makers, imaging companies, laboratories, insurers, medical schools, software vendors, and public-health institutions will need to reorganize around prevention.

The pharmaceutical industry will face the greatest opportunity. Today, many of the most profitable medicines are chronic treatments. The Medicine of Future asks the industry to create preventive molecules and molecule soups that are used in risk-defined populations before disease. This will require new regulatory science, new trial designs, new safety monitoring, and new reimbursement models.

Imaging and diagnostics will also change. The purpose of imaging should not be only to see established disease better. It should be to identify pre-disease signatures that are actionable. A scan that finds pathology too late is less valuable than a low-cost test that identifies a reversible trajectory early. Imaging companies should compete not only on resolution, but on prevention impact.

Laboratories will become risk-navigation engines. Blood tests, genomics, proteomics, metabolomics, microbiome tests, and cell-free DNA may become part of disease-origin monitoring. But this requires discipline. Not every marker is meaningful. Not every early signal should trigger treatment. AI must help distinguish noise from actionable risk.

Insurers will need to learn how to pay now for benefits later. This is difficult because people change insurance plans, and prevention benefits may appear years later. New long-term models are needed: prevention accounts, public reinsurance, outcome contracts, and disease-specific prevention funds.

Medical device companies should shift toward low-burden, continuous, validated monitoring that prevents disease progression rather than simply producing expensive interventions after damage. The highest-value device may be the one that keeps the patient away from the operating room.

The industry should not be destroyed. It should be reoriented. The Medicine of Future is not anti-industry. It is anti-disease-centered industry.

14. Ethical, Scientific, and Regulatory Boundaries

Medicine of Future must have clear ethical, scientific, and regulatory boundaries, even if this paper does not attempt to develop them in detail. A system that predicts disease and prescribes preventive molecules before symptoms must remain voluntary, evidence-based, privacy-protected, and human-governed. Preventive molecules should be used only when there is a serious disease-risk rationale, reliable safety evidence, and measurable expected benefit. Genetic information must be used only for prevention and counseling, not for coercion, social ranking, eugenics, employment, insurance, marriage, or judgment of human worth; the same boundary applies to the HelixBridge concept, which is not a designer-baby or mate-selection program. AI should accelerate discovery and decision support, but final high-stakes decisions must remain under professional and human oversight. The goal is not to turn healthy people into permanent patients, but to identify truly high-probability, preventable disease trajectories and reduce suffering across society.

15. Implementation Roadmap

The Medicine of Future cannot be implemented as a slogan. It should be built in phases, with scientific review, ethics review, regulatory review, and measured pilots.

Phase	Primary work	Practical output
0. Concept and evidence consolidation	Finalize the position paper, source base, terminology, and advisory structure.	Concept package and evidence matrix.
1. Disease-priority selection	Select diseases with strong burden, measurable risk, known biology, and plausible preventive molecule targets.	Initial disease-priority list.

2. Genetic and family-risk architecture	Build family-history intake, pharmacogenomic logic, validated genetic-risk modules, and risk-map reports.	Personal disease-risk map prototype.
3. Preventive molecule review	Catalog existing preventive molecules and near-term candidates by disease family.	Preventive molecule library.
4. AI prevention platform	Create AI tools for risk integration, literature mining, molecule-target matching, and clinician review.	Clinician-reviewed prevention engine.
5. Pilot in one or two disease areas	Start with cardiovascular/metabolic disease and voluntary preconception genetic screening.	Measured prevention pilot.
6. Prevention-trial program	Design risk-enriched trials of preventive molecules or molecule combinations.	Trial protocols and regulatory pathway.
7. Economic pilot	Test payment for risk reduction and disease non-occurrence.	Outcome-based prevention contract.
8. Scaling and learning system	Expand disease modules, update AI, monitor outcomes, and adjust protocols.	Learning prevention network.

The first practical disease areas should be chosen carefully. Cardiovascular/metabolic disease is attractive because risk factors, biomarkers, and existing preventive medications are already mature. Preconception genetic screening is attractive because it already fits the upstream logic and is anchored in existing carrier-screening principles. Cancer prevention in high-risk groups is another early candidate, but must be managed with careful risk-benefit analysis.

The first implementation should not overpromise. It should show that the new medicine can do three things: identify risk earlier, recommend preventive actions more precisely, and measure outcomes honestly.

16. Measures of Success

Medicine of Future must not measure success by the number of tests sold, the number of AI reports generated, or the number of preventive molecules prescribed. It must measure disease avoided, disease delayed, harm reduced, safety preserved, and healthy function maintained.

Metric domain	Examples
Disease non-occurrence	Reduced transition from high-risk state to disease diagnosis; delayed age of onset; lower incidence in risk-defined cohorts.
Molecular prevention effectiveness	Risk reduction, biomarker reversal, organ-function preservation, fewer acute events, fewer late-stage diagnoses.
Genetic-risk prevention	High-risk reproductive pairings identified before pregnancy; counseling completion; informed reproductive decision-making.
Safety	Adverse events, discontinuation, long-term toxicity, inappropriate treatment of low-risk persons, overdiagnosis.
AI performance	Calibration, subgroup performance, drift, explainability, clinician override rate, incident reporting.
Economic performance	Avoided admissions, fewer complications, lower late-stage treatment intensity, cost-effectiveness, healthy life years.
Equity	Access across income, geography, ancestry, disability, language, and digital literacy.
Human understanding	Patient comprehension of probability, consent, residual risk, and alternatives.

The ideal endpoint is not only longer life. It is longer healthy life with fewer disease years, fewer catastrophic diagnoses, fewer expensive rescue procedures, less disability, and less family suffering.

Because prevention can cause harm when misused, every metric must have a safety mirror. If a program reduces disease events but creates anxiety, overtreatment, inequity, or serious adverse effects, it has failed the broader purpose. The Medicine of Future must be ambitious without becoming reckless.

17. Anticipated Objections and Responses

Any concept that proposes to move the center of medicine from treatment of disease to prevention of disease will meet resistance. This resistance is expected and, in fact, necessary. A serious Medicine of Future cannot be

built only on enthusiasm. It must survive scientific criticism, economic criticism, ethical criticism, regulatory criticism, and the natural skepticism of physicians, patients, investors, and society.

The objections are especially important because this proposal intentionally sounds futuristic. It speaks about preventive molecules, disease-specific molecule soups, AI-designed prevention, personal genetic and family-history risk maps, and medical economics based on non-occurrence of disease. These ideas may sound too ambitious, and perhaps even science fiction. But the history of medicine repeatedly shows that concepts once seen as impossible can become normal medical practice when science, technology, and social need converge.

The purpose of the following table is not to dismiss objections, but to discipline the concept. Each objection identifies a real danger or a real limitation. The response explains how Medicine of Future should answer that danger without weakening the central thesis: medicine must stop accepting disease as the main economic and scientific event and must begin organizing itself around prevention, molecular interception, and reduction of future suffering.

Objection	Response
This is too futuristic and sounds like science fiction.	Yes, intentionally. But the history of medicine is the history of yesterday's science fiction becoming routine. Vaccines, organ transplantation, IVF, genomics, monoclonal antibodies, AI protein prediction, and mRNA platforms all would once have sounded impossible.
Not every disease can be prevented.	Correct. The goal is not literal abolition of disease. The goal is minimization of probability, delayed onset, reduced severity, and prevention of irreversible harm when possible.
Preventive molecules may overmedicalize healthy people.	This is a real danger. That is why preventive molecules must be risk-selected, evidence-based, consented, monitored, and used only when expected benefit justifies exposure.
Prevention does not always save money.	True. The claim is not simplistic savings. The claim is that a country cannot sustainably keep expanding late-stage treatment complexity as its main strategy.
AI could make biased or unsafe recommendations.	AI must be validated, transparent, monitored, human-governed, and subject to regulatory and ethical oversight. High-stakes decisions require professional review.
Genetics could become eugenics or discrimination.	The model explicitly rejects coercion, social ranking, mate selection, enhancement selection, or genetic discrimination. Genetics is used for prevention and counseling, not human valuation.
Pharmaceutical companies may simply create more expensive lifelong drugs.	That risk exists. The economic model must reward measurable disease non-occurrence, safety, and long-term value, not just chronic prescription volume.
Lifestyle and environment are being minimized.	They are not minimized. They remain necessary. The argument is that lifestyle and hygiene are not enough to define the future. They must be joined by molecular prevention and AI-guided risk targeting.

18. Formal Position Statements

The following position statements summarize the core philosophy of this paper in direct form. They are intentionally written as declarations rather than as neutral observations. A position paper should not only describe a possible future; it should state what future medicine should become.

These statements preserve the central thesis: the present medical system is too strongly organized around disease after it appears, while the Medicine of Future should be organized around preventing disease from appearing. Curative medicine must remain powerful, but it should no longer define the prestige, economics, and scientific center of medical civilization.

The statements below can serve as the conceptual platform for future presentations, investor discussions, scientific review, advisory-board formation, public communication, and later development of a more formal manifesto for Medicine of Future.

- The base of Medicine of Tomorrow should be prevention, while maintaining the full curative function of medicine.

- The present medical system is structurally centered on disease after it appears, and this creates a self-feeding economic circle of treatment, technology, pharmaceuticals, infrastructure, and cost escalation.
- The most important new R&D direction should be preventive molecules: one molecule or a small soup of molecules designed to prevent individual diseases or disease families before they become clinical reality.
- Preventive molecules should be selected by genetic makeup, family history, pharmacogenomics, biomarkers, exposures, and AI-based risk models rather than prescribed blindly to everyone.
- Traditional prevention - unprocessed food, healthy diet, exercise, personal hygiene, societal hygiene, vaccination, clean water, and public health - remains essential but is not sufficient as the full future paradigm.
- Voluntary preconception genetic screening, as represented by the HelixBridge concept, should be one upstream gate in the broader Medicine of Future, but not the whole concept.
- AI will be the monumental engine that makes this paradigm practical by integrating data, discovering targets, designing molecules, simulating prevention trials, and continuously learning from outcomes.
- Curative medicine will remain necessary, but it should no longer define the center of medical economics and prestige.
- Medical education should train disease-origin engineers, preventive pharmacologists, genetic-risk interpreters, and AI-literate clinicians, not only disease treaters.
- The pharmaceutical and medical technology industries should be redirected from disease management toward disease non-occurrence.
- The model must reject coercion, eugenics, social ranking, genetic discrimination, and overmedicalization of low-risk people.
- The success of Medicine of Future should be measured by disease avoided, disease delayed, healthy life preserved, safety maintained, and suffering reduced.

19. Conclusion

Medicine of Tomorrow, or Medicine of Future, is not simply a more modern version of present medicine. It is a proposed change in the center of medical gravity. Present medicine largely waits for disease and then mobilizes impressive force. Future medicine should organize that force before disease, before irreversible harm, before the sick body becomes the economic event.

The core of this vision is prevention, but not prevention as polite rhetoric. The core is preventive molecular science: new molecules, and small soups of molecules, designed disease-by-disease to prevent known diseases from developing. These preventive molecules will be selected by personal genetics, family history, pharmacogenomics, biomarkers, exposures, and AI-guided risk maps. They will work alongside food, diet, exercise, hygiene, vaccination, and public-health infrastructure, but they will give prevention a new scientific power.

The HelixBridge preconception genetic screening concept is an early upstream example. It shows the philosophical move: identify risk before pregnancy, before uncertainty, and before irreversible inherited disease when prevention is possible. Medicine of Future expands the same logic to the whole life course: before infarction, before cancer, before autoimmune destruction, before dementia, before organ failure, before severe infection, before disability.

This vision is futuristic and even sci-fi in spirit. It should be. A medicine that only improves treatment will remain trapped in disease. A medicine that learns how to prevent the appearance of disease will reshape human life, national budgets, medical education, pharmaceutical research, hospitals, insurance, and the meaning of medical progress itself.

The immediate next step is to build a serious source matrix and disease-priority list, then design the first pilots: one in voluntary preconception genetic screening and one in cardiovascular/metabolic preventive-molecule medicine. The long-term goal is larger: a civilization in which medicine is no longer financially and institutionally dependent on disease, but scientifically organized against it.

Appendix A. Disease-to-Preventive-Molecule Development Matrix

This appendix converts the concept into a practical R&D template. Each disease family should eventually be reviewed by scientists, clinicians, ethicists, AI specialists, economists, and regulators.

Disease family	Risk identification	Candidate prevention logic	Development challenge
Coronary artery disease	Family history, lipids, Lp(a), blood pressure, diabetes, smoking, obesity, genetics, imaging.	Lipid-lowering, inflammation control, metabolic/obesity treatment, plaque stabilization.	Long-term safety and deciding who needs early molecular intervention.
Breast cancer	Family history, BRCA/PALB2 and other genes, breast density, reproductive history, validated risk models.	Hormone-pathway risk reduction, immune surveillance, early clone suppression.	Balancing benefit against thrombotic, menopausal, bone, and other side effects.
Colorectal cancer	Family history, Lynch/polyposis genes, microbiome, inflammation, diet, colonoscopy findings.	Anti-inflammatory, microbiome, immune, and early adenoma-interception molecules.	Avoiding overuse in low-risk people and proving cancer incidence reduction.
Alzheimer's and neurodegeneration	Family history, APOE and other risk markers, plasma biomarkers, cognition, imaging.	Anti-protein aggregation, mitochondrial support, neuroinflammation calibration, vascular protection.	Very long preclinical windows and high safety requirements.
Type 2 diabetes	Family history, BMI/waist, glucose patterns, A1c, insulin resistance, fatty liver, polygenic risk.	Metabolic molecules, GLP-1/GIP pathways, liver-fat reduction, microbiome metabolites.	Sustained adherence, cost, and differentiating weight effects from disease-origin effects.
Autoimmune disease	Family history, HLA/genetics, autoantibodies, inflammatory biomarkers, microbiome.	Tolerance induction, cytokine calibration, barrier repair, microbiome molecules.	Preventing disease without suppressing needed immune defense.
Severe inherited disease in offspring	Carrier screening, family history, genetic-origin modules, partner testing.	Preconception counseling, reproductive options, disease-specific risk identification.	Ethical consent, privacy, avoiding social ranking or coercion.

Appendix B. Present Medicine vs. Medicine of Future

This appendix presents the contrast between the dominant medical model of today and the proposed model of Medicine of Future. The purpose is not to deny the achievements of present medicine. Modern medicine is extraordinarily powerful when disease is already present. Its weakness is that most of its infrastructure, cash flow, training, technology, and prestige still activate after disease becomes visible.

The comparison below shows the proposed shift in center of gravity. Present medicine is mainly organized around diagnosis, treatment, monitoring, hospitalization, procedures, chronic drug use, and late-stage rescue. Medicine of Future is organized around disease non-occurrence, delayed onset, risk reduction, preventive molecules, genetic and family-history targeting, AI-built prevention systems, and preservation of healthy life.

This table should be read as a strategic contrast, not as an absolute division. Curative medicine will remain necessary. Hospitals, specialists, imaging, drugs, and surgery will remain essential. The argument is that they should become the rescue and repair arm of medicine, while the main scientific and economic direction should move upstream toward prevention before disease appears.

Dimension	Present dominant model	Medicine of Future model
Center of gravity	Treatment after disease appears.	Prevention before disease appears.
Economic event	Diagnosis, hospitalization, procedure, scan,	Disease non-occurrence, delayed onset,

	chronic prescription.	preserved function.
R&D focus	Therapies for established disease and late-stage complications.	Preventive molecules and disease-origin interruption.
Main data object	Problem list and diagnosis codes.	Personal disease-risk map.
Genetics	Used selectively for diagnosis, treatment, or reproductive risk.	Used as a prevention-targeting tool with consent and safeguards.
AI role	Administrative, diagnostic, documentation, and decision support.	Disease-origin discovery, molecule design, risk mapping, prevention monitoring.
Medical education	Pathology recognition and disease treatment.	Disease-origin engineering and preventive pharmacology.
Hospital role	Center of medical civilization.	Essential rescue and complex-care site, but not the main measure of success.

Appendix C. Research and Development Agenda

This appendix translates the concept into a research and development agenda. Medicine of Future cannot remain only a philosophical critique of present medicine. It must become a scientific program capable of producing disease-origin maps, preventive molecules, AI-guided risk models, prevention trials, safety registries, and new economic structures.

The agenda below is intentionally broad because the proposed transformation is not one invention, one drug, one device, or one software platform. It is a redirection of medical R&D itself. The central research question becomes: for each major disease, what are the earliest biological origins, who is at highest future risk, what molecular intervention can interrupt the trajectory, and how can this be done safely before the person becomes clinically ill?

This agenda should become a living development plan. Each item will require scientific review, source mapping, evidence grading, regulatory analysis, ethical review, and eventually pilot projects. The first goal is not mass deployment. The first goal is to build a credible foundation for a new medical civilization based on prevention, genetics-guided targeting, AI-built discovery, and molecular non-occurrence of disease.

- Create disease-origin atlases for major disease families.
- Build a preventive-molecule taxonomy across drugs, biologics, antibodies, vaccines, peptides, RNA tools, metabolites, microbiome molecules, and future classes.
- Develop family-history and genetic-risk maps that are understandable, privacy-protected, and clinically actionable.
- Identify diseases with the best early preventive-molecule opportunity: high burden, measurable risk, plausible molecular target, and acceptable safety window.
- Design AI systems that can match risk profiles to preventive molecule candidates and generate testable hypotheses rather than unreviewed medical commands.
- Create prevention trials that enroll people by risk probability and preclinical biomarker status rather than waiting for disease diagnosis.
- Develop long-term safety registries for preventive molecules, because preventive exposure may last years or decades.
- Create economic models that pay for disease non-occurrence without encouraging overtreatment or denial of care.
- Build ethical and legal rules for genetics, consent, AI transparency, privacy, equity, and the right not to know certain risk information.
- Train a new generation of clinicians and researchers in preventive molecular medicine.

References

1. Centers for Medicare & Medicaid Services. NHE Fact Sheet. National Health Expenditure Data. Updated June 24, 2026. https://www.cms.gov/data-research/statistics-trends-and-reports/national-health-expenditure-data/nhe-fact-sheet
2. Centers for Disease Control and Prevention. Fast Facts: Health and Economic Costs of Chronic Conditions. Updated May 26, 2026. https://www.cdc.gov/chronic-disease/data-research/facts-stats/index.html
3. World Health Organization. Noncommunicable diseases fact sheet. Updated September 25, 2025. https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases
4. Cohen JT, Neumann PJ, Weinstein MC. Does Preventive Care Save Money? Health Economics and the Presidential Candidates. New England Journal of Medicine. 2008;358:661-663. doi:10.1056/NEJMp0708558.
5. U.S. Preventive Services Task Force. Statin Use for the Primary Prevention of Cardiovascular Disease in Adults: Preventive Medication. Final Recommendation Statement. August 23, 2022. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/statin-use-in-adults-preventive-medication
6. U.S. Preventive Services Task Force. Breast Cancer: Medication Use to Reduce Risk. Final Recommendation Statement. September 3, 2019. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-medications-for-risk-reduction
7. Centers for Disease Control and Prevention. Clinical Guidance for PrEP. HIV Nexus. Updated April 30, 2026. https://www.cdc.gov/hivnexus/hcp/prep/index.html
8. U.S. Food and Drug Administration. FDA Approves New Drug to Prevent RSV in Babies and Toddlers. July 17, 2023. https://www.fda.gov/news-events/press-announcements/fda-approves-new-drug-prevent-rsv-babies-and-toddlers
9. U.S. Food and Drug Administration. FDA Approves First Treatment to Reduce Risk of Serious Heart Problems Specifically in Adults with Obesity or Overweight. March 8, 2024. https://www.fda.gov/news-events/press-announcements/fda-approves-first-treatment-reduce-risk-serious-heart-problems-specifically-adults-obesity-or
10. U.S. Preventive Services Task Force. Folic Acid Supplementation to Prevent Neural Tube Defects: Preventive Medication. August 1, 2023. https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/folic-acid-for-the-prevention-of-neural-tube-defects-preventive-medication
11. World Health Organization. Vaccines and immunization. Current health topic page. https://www.who.int/health-topics/vaccines-and-immunization
12. U.S. Food and Drug Administration. Artificial Intelligence for Drug Development. Content current as of May 1, 2026. https://www.fda.gov/about-fda/center-drug-evaluation-and-research-cder/artificial-intelligence-drug-development
13. U.S. Food and Drug Administration. Considerations for the Use of Artificial Intelligence to Support Regulatory Decision-Making for Drug and Biological Products. January 6, 2025. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/considerations-use-artificial-intelligence-support-regulatory-decision-making-drug-and-biological
14. EMBL-EBI and Google DeepMind. AlphaFold Protein Structure Database. https://alphafold.ebi.ac.uk/
15. World Health Organization. Ethics and governance of artificial intelligence for health: guidance on large multi-modal models. March 25, 2025. https://www.who.int/publications/i/item/9789240084759
16. National Academy of Medicine. Health Care Artificial Intelligence Code of Conduct. 2025. https://nam.edu/our-work/programs/leadership-consortium/health-care-artificial-intelligence-code-of-conduct/
17. U.S. Food and Drug Administration. Artificial Intelligence-Enabled Device Software Functions: Lifecycle Management and Marketing Submission Recommendations. January 7, 2025. https://www.fda.gov/regulatory-information/search-fda-guidance-documents/artificial-intelligence-enabled-device-software-functions-lifecycle-management-and-marketing
18. American College of Obstetricians and Gynecologists. Carrier Screening for Genetic Conditions. Committee Opinion No. 691. 2017. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2017/03/carrier-screening-for-genetic-conditions
19. American College of Obstetricians and Gynecologists. Carrier Screening in the Age of Genomic Medicine. Committee Opinion No. 690. 2017. https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2017/03/carrier-screening-in-the-age-of-genomic-medicine
20. Gregg AR, Aarabi M, Klugman S, et al. Screening for autosomal recessive and X-linked conditions during pregnancy and preconception: a practice resource of the American College of Medical Genetics and Genomics. Genetics in Medicine. 2021;23:1793-1806. https://pmc.ncbi.nlm.nih.gov/articles/PMC8488021/
21. U.S. Food and Drug Administration. Table of Pharmacogenomic Biomarkers in Drug Labeling. Updated March 3, 2026. https://www.fda.gov/drugs/science-and-research-drugs/table-pharmacogenomic-biomarkers-drug-labeling
22. National Human Genome Research Institute. Pharmacogenomics Fact Sheet. Updated December 24, 2024. https://www.genome.gov/about-genomics/educational-resources/fact-sheets/pharmacogenomics

23. National Human Genome Research Institute. Polygenic Risk Scores. https://www.genome.gov/Health/Genomics-and-Medicine/Polygenic-risk-scores

24. HelixBridge Service Proposal_07092026. Boris Petrikovsky, MD, PhD; Lev Neymotin, PhD. Draft date: July 9, 2026. Internal concept document supplied by authors.

25. World Health Organization. Ottawa Charter for Health Promotion. First International Conference on Health Promotion, Ottawa, 1986. https://www.who.int/teams/health-promotion/enhanced-wellbeing/first-global-conference

26. Office of the National Coordinator for Health Information Technology. HTI-1 Final Rule: Health Data, Technology, and Interoperability; Algorithm Transparency and Information Sharing. 2024. https://healthit.gov/regulations/hti-rules/hti-1-final-rule/