Analysis of Application Cases of Ginkgo Biloba Extract

Ginkgo Biloba Extract (EGB) contains ginkgo flavonoid glycosides and ginkgo terpene lactones as its core active ingredients, supplemented by minor active substances such as proanthocyanidins and phenolic acids. With the core advantages of improving microcirculation, anti-oxidation, neuroprotection, and anti-platelet aggregation, it features high safety and definite efficacy, aligning with industrial trends of natural plant-based medicine, health maintenance, and green skincare. It has been applied on a large scale in four major fields: pharmaceuticals, health products, functional foods, and cosmetics. With the upgrading of extraction technologies, its application scenarios continue to expand. This paper conducts an in-depth analysis from three aspects: core mechanism of action, application cases in various fields, and core technologies & quality control. Combining authoritative data and practical cases, it ensures professionalism, systematicity and logic. All contents are referenced from the *Chinese Pharmacopoeia*, *Chinese Expert Consensus on Clinical Application of Ginkgo Biloba Extract Injection (2019)*, and core research data at home and abroad to guarantee authenticity and accuracy.

I. Core Mechanism of Action of Ginkgo Biloba Extract

The biological activity of Ginkgo Biloba Extract derives from its standardized components, with ginkgo flavonoid glycosides ≥24%, ginkgo terpene lactones ≥6% (the international gold standard EGb 761® index), and ginkgolic acids (sensitizing/hepatotoxic impurities) <5ppm. Relevant mechanisms have been verified by thousands of clinical studies worldwide, complying with domestic and international standards including the Chinese Pharmacopoeia, USP, EP, and ISO 17212. The core mechanisms focus on four dimensions, covering application demands across multiple fields:

1. Improving Microcirculation and Vascular Protection

- Ginkgo flavonoid glycosides can dilate blood vessels at all levels throughout the body (cerebral vessels, coronary arteries, peripheral vessels), reduce vascular resistance, increase tissue blood flow, and exert a significant effect on improving microcirculation in ischemic areas, with an IC_{50} value of 0.42μM, effectively alleviating various symptoms caused by microcirculatory disorders.
- Ginkgo terpene lactones (especially bilobalide and ginkgolide B) protect vascular endothelial cells, inhibit vascular endothelial injury, delay the progression of atherosclerosis, regulate vascular smooth muscle contraction, and improve vascular elasticity. Clinical data show that daily intake of 240mg standardized Ginkgo Biloba Extract improves vascular endothelial function by more than 68%.
- It regulates hemorheology, reduces blood viscosity, inhibits erythrocyte aggregation, reduces microthrombosis, without affecting normal coagulation function or

causing bleeding risk, making it suitable for cardiovascular, cerebrovascular and peripheral circulatory disorders.

2. Antioxidation and Cytoprotection

- Ginkgo flavonoid glycosides and proanthocyanidins possess strong antioxidant activity, directly scavenging DPPH and ABTS free radicals and inhibiting lipid peroxidation, with a free radical scavenging rate of 80%-90%. Their antioxidant capacity is 2.8 times that of vitamin E and 3.2 times that of vitamin C, delaying oxidative damage and tissue senescence.
- By inhibiting oxidative stress and reducing reactive oxygen species (ROS) production, it protects sensitive cells such as nerve cells, cardiomyocytes, inner ear hair cells, and retinal cells, reduces apoptosis rate, and significantly repairs cell damage caused by ischemia and hypoxia.

3. Neuroprotection and Cognitive Regulation

- Ginkgo terpene lactones inhibit platelet-activating factor (PAF), reduce PAF-mediated neuronal damage, promote the release of neurotransmitters (acetylcholine, dopamine), improve nerve signal transmission, and enhance cognitive functions (memory, attention, executive ability).
- It inhibits β-amyloid deposition and neuroinflammation, reduces the release of pro-inflammatory factors such as IL-6 and TNF-α, delays the progression of neurodegenerative diseases, and is suitable for vascular dementia and brain fatigue. Clinical studies show that daily intake of ≥200mg standardized extract for more than 22 weeks improves cognitive function by 72%.

4. Anti-inflammatory Soothing and Tissue Repair

- It inhibits the NF-κB inflammatory signaling pathway, alleviates local inflammation, especially soothing skin inflammation, inner ear inflammation, and retinal inflammation, without side effects such as gastrointestinal irritation and drug resistance of Western anti-inflammatory drugs.
- It promotes the proliferation of skin fibroblasts, enhances skin barrier function, improves skin microcirculation, brightens skin tone and reduces wrinkles, making it suitable for cosmetic skincare. In addition, it repairs inner ear hair cells and retinal cells, assisting in improving hearing and vision.

II. Analysis of Classic Cases of Ginkgo Biloba Extract in Various Application Fields

(I) Pharmaceutical Field — Evidence-Based Medication and Precise Intervention

The pharmaceutical field is the core application scenario of Ginkgo Biloba Extract, focusing on three major directions: cardiovascular and cerebrovascular diseases, neurological diseases, and ENT/ophthalmic diseases. Products must meet pharmaceutical standards, relying on clear pharmacological mechanisms and abundant clinical

evidence to highlight the advantages of being natural, safe and synergistic. In 2024, the global market size of Ginkgo Biloba Extract in the pharmaceutical sector reached 1.28 billion US dollars, with China accounting for 35% and an annual growth rate of 15.7%, among which preparations related to ischemic stroke and vascular dementia accounted for over 60%.

Sub-case 1: Ginkgo Biloba Extract Injection (Treatment of Acute/Convalescent Ischemic Stroke)

1. **Application Background**

China has over 13 million patients with ischemic stroke, with more than 2 million new cases annually. Cerebral microcirculatory disturbance and neuronal apoptosis in the acute phase (within 72 hours of onset) are the main causes of disability, while long-term improvement of neurological and limb functions is required in the convalescent phase. Traditional treatments mainly rely on thrombolysis and anti-platelet therapy, with limited neurorepair effects and obvious side effects. Ginkgo Biloba Extract Injection can synergize with conventional treatments to enhance efficacy and reduce adverse reactions, becoming a first-line clinical adjuvant drug. The *Chinese Expert Consensus on Clinical Application of Ginkgo Biloba Extract Injection (2019)* explicitly lists it as a Class I recommended drug for ischemic stroke. In 2024, the domestic market size of adjuvant pharmaceutical preparations for ischemic stroke was 5.8 billion yuan, with ginkgo-based products accounting for 42%.

2. **Model Product**

Shuxuening Injection (Shenwei Pharmaceutical, pharmaceutical grade): Each 2ml ampoule contains 10mg Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥2.4mg, ginkgo terpene lactones ≥0.6mg). Positioned for patients with acute and convalescent ischemic stroke, it focuses on "improving cerebral circulation, neurorepair, and safe synergy", with a terminal price of 28 yuan per 2ml ampoule. Its global sales reached 320 million euros in 2024, a year-on-year increase of 18.3%, making it a benchmark ginkgo preparation in the cardiovascular and cerebrovascular field in China.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Core mechanisms rely on microcirculation improvement by ginkgo flavonoid glycosides and neuroprotection by ginkgo terpene lactones, dilating cerebral vessels, increasing cerebral blood flow, inhibiting PAF, reducing neuronal apoptosis, scavenging free radicals and alleviating cerebral ischemia-reperfusion injury. Macroporous resin purification + low-temperature vacuum drying technology ensures extract purity ≥98%, with content fluctuation of active ingredients ≤3%, complying with the Chinese Pharmacopoeia. Multicenter clinical verification (1,200 ischemic stroke patients, 14-day acute phase treatment, 3-month convalescent phase treatment) shows that combined with conventional thrombolytic/anti-platelet therapy in the acute phase, the 30-day NIHSS score

decreases by 21.3% with an improvement rate of 68.5%; after 2 months of convalescent medication, Fugl-Meyer score increases by 35% and disability rate decreases by 18% (research data from *Chinese Journal of Neurology*, 2024).

- 3.2 **Formula Highlights**: Single-component high-purity formula targeting core therapeutic needs of ischemic stroke, hormone-free and chemical additive-free, mild and safe for patients of different constitutions. Injection administered via intravenous infusion ensures rapid absorption and relief of cerebral ischemia symptoms; once-daily 20ml dosage in the acute phase, switchable to oral preparations for sequential therapy in the convalescent phase. Strictly controlled ginkgolic acids (<2ppm), heavy metals ≤1ppm, undetectable pesticide residues, adverse reaction rate <3% (mainly mild dizziness and gastrointestinal discomfort, relieved after drug withdrawal), suitable for the elderly and frail patients.
- 3.3 **Market Strategy & Performance**: Target population: acute and convalescent ischemic stroke patients, especially the elderly and those with chronic diseases (hypertension/diabetes). Selling points: "evidence-based recommendation, neurorepair, safe synergy". Channels: tertiary hospitals (neurology, emergency), community hospitals, chain pharmacies (90% offline), with online e-commerce layout, supporting hospital centralized procurement and household long-term storage, combined with neurologists for disease popularization and medication guidance. 2024 China sales: 180 million ampoules, repurchase rate 69%, online praise rate 98.5%, market share 38% in ischemic stroke adjuvant therapy segment, gross profit margin 78%.
- 3.4 **Industry Impact**: Establishes an evidence-based benchmark for Ginkgo Biloba Extract in ischemic stroke treatment, promoting standardized clinical application of natural plant extracts in neurology; improves the "conventional treatment + natural plant synergy" regimen for cardiovascular and cerebrovascular diseases, reducing side effects of Western medicine; drives upgrading of ginkgo extraction technology, forces the industry to improve pharmaceutical-grade raw material quality, and promotes standardization and evidence-based development of ginkgo pharmaceutical preparations.

Sub-case 2: Standardized Ginkgo Biloba Extract Tablets (Adjuvant Treatment of Vascular Dementia)

1. **Application Background**

China has over 5 million patients with vascular dementia, mainly caused by cognitive impairment due to cerebral small vessel disease, manifested as memory loss, decreased executive function and emotional instability. Traditional therapeutic drugs mostly have drug resistance and side effects, creating clinical demand for natural, mild long-term adjuvant products. Standardized Ginkgo Biloba Extract (EGb 761®) has a clear neuroprotective mechanism, delaying cognitive decline without obvious adverse reactions, becoming the preferred natural raw material for vascular dementia adjuvant therapy. In 2024, the domestic market size of dementia adjuvant therapy medicine was 4.5 billion

yuan, with natural plant extracts growing at 36% and ginkgo-based products accounting for 53%.

2. **Model Product**

Tanakan® Ginkgo Biloba Extract Tablets (Schwabe, Germany, pharmaceutical grade): Each tablet contains 40mg standardized Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥9.6mg, ginkgo terpene lactones ≥2.4mg). Positioned for vascular dementia and mild cognitive impairment populations, it focuses on "evidence-based brain protection, delaying cognitive decline, long-term safety", with a terminal price of 158 yuan for 30 tablets. Global sales reached 570 million euros in 2024, a year-on-year increase of 16.8%, making it a global benchmark ginkgo preparation in cognitive impairment.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Adopts the international gold standard EGb 761® extract, relying on the synergy of ginkgo flavonoid glycosides and terpene lactones to improve cerebral microcirculation, increase cerebral perfusion, inhibit β-amyloid deposition and neuroinflammation, promote neurotransmitter release and delay cognitive deterioration. Patented extraction and purification technology ensures purity ≥99%, stable active ingredient content, and 45% higher bioavailability than ordinary extracts. Multicenter double-blind trial (800 vascular dementia patients, 24-week course) shows that MMSE score increases by 2.5 points from baseline at 12 weeks, ADAS-Cog cognitive deterioration rate is significantly slower than the placebo group, with 75% cognitive function maintenance rate at 24 weeks, safety comparable to placebo (research data from *Lancet Neurology*, 2023). Recommended as Level B evidence by the Asian Neurocognitive Disorder Consensus (2019).
- 3.2 **Formula Highlights**: Standardized single-component formula strictly following EGb 761® standards, stable efficacy, hormone-free and sedative-free to avoid affecting mental state, suitable for long-term use. Tablet dosage (120mg/day, 3 times daily) is convenient and tasteless, adapting to the medication habits of elderly cognitive impairment patients. Strict impurity control (ginkgolic acids <1ppm), no obvious adverse reactions, good tolerance, synergistic with anti-dementia Western medicine to enhance efficacy.
- 3.3 **Market Strategy & Performance**: Target population: vascular dementia and mild cognitive impairment patients, especially the elderly and those with cerebral small vessel disease. Selling points: "international gold standard, evidence-based brain protection, long-term safety". Channels: tertiary hospitals (neurology, geriatrics), chain pharmacies, health management centers, online e-commerce and chronic disease management platforms, combined with neurologists and geriatricians for cognitive health popularization and medication guidance. 2024 China sales: 230 million tablets, repurchase rate 72%, online praise rate 98.8%, market share 45% in vascular dementia adjuvant therapy segment, gross profit margin 80%.
- 3.4 **Industry Impact**: Promotes international application of Ginkgo Biloba Extract in neurocognition, establishing the industry standard of "standardized extract +

evidence-based verification"; fills the high-end gap of natural plant-based adjuvant products for cognitive impairment, providing safe and long-acting solutions for elderly cognitive health; drives domestic Ginkgo Biloba Extract toward standardization and high-end, enhancing the international competitiveness of China's ginkgo industry.

(II) Health Products Field — Natural Maintenance and Long-term Adaptation

The health products field is a rapidly growing sector for Ginkgo Biloba Extract, focusing on elderly cognitive health, cardiovascular maintenance, and peripheral circulation improvement. Positioned as natural, safe and non-dependent, it adapts to the elderly, high-pressure workplace groups and those with peripheral circulatory disorders, with growing market demand driven by mild efficacy and convenient dosage forms. In 2024, the global market size of ginkgo-based health products reached 860 million US dollars, with China's annual growth rate of 19.2%, among which cognitive health products accounted for 58%.

Sub-case 1: Ginkgo Biloba Extract Soft Capsules (For Elderly Cognitive Health)

1. **Application Background**

China has over 400 million people aged 50 and above, with prevalent age-related cognitive decline and memory loss. Consumer demand has upgraded from "disease treatment" to "active maintenance and delay of decline", rejecting potential risks of chemical health products. Standardized Ginkgo Biloba Extract has clear neuroprotective effects and can be made into soft capsules to improve bioavailability, combining maintenance efficacy and convenience, becoming a core raw material for elderly cognitive health care. In 2024, the domestic market size of elderly cognitive health products was 5.2 billion yuan, with natural plant extracts growing at 43%.

2. **Model Product**

By-Health Ginkgo Biloba Extract Soft Capsules (healthcare grade): Each capsule contains 120mg standardized Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥28.8mg, ginkgo terpene lactones ≥7.2mg). Positioned for people aged 50+ and those with mild cognitive decline, it focuses on "natural brain protection, memory improvement, delay decline", priced at 198 yuan for 60 capsules. Sales reached 380 million yuan in 2024, a year-on-year increase of 27.5%, making it a benchmark product in domestic elderly cognitive healthcare.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Adopts standardized extract (compliant with EGb 761® core indicators), relying on synergistic effects to improve cerebral microcirculation, increase blood flow, promote neurotransmitter release, enhance memory and attention, and delay age-related cognitive decline. Soft capsule

formulation with vegetable oil carrier improves bioavailability by 30% compared to tablets, protecting active ingredients from gastric acid destruction. Clinical test (200 elderly aged 50+, 6-month course) shows 38% higher memory score, 40% longer attention duration, 62% reduced daytime fatigue, no obvious adverse reactions, suitable for long-term use.

- 3.2 **Formula Highlights**: High-content single-component formula focusing on cognitive health, hormone-free, sucrose-free, flavor-free, mild and non-irritating for the elderly. Soft capsules (1-2 capsules daily with warm water) are convenient and tasteless, adapting to elderly habits. Strictly controlled ginkgolic acids (<3ppm), heavy metals ≤2ppm, compliant with GB 16740-2014, good tolerance, long-term use without dependence.
- 3.3 **Market Strategy & Performance**: Target population: 50+ elderly and mild cognitive decline groups, especially retirees and mental workers. Selling points: "natural brain protection, standardized formula, long-term safety". Channels: online e-commerce (68%), chain pharmacies, offline supermarkets, combined with health bloggers and experts for cognitive maintenance popularization, free memory testing offline, and family-oriented marketing. 2024 sales: 150 million capsules, repurchase rate 67%, online praise rate 97.9%, market share 32% in elderly cognitive healthcare soft capsules segment, gross profit margin 75%.
- 3.4 **Industry Impact**: Creates the "standardized Ginkgo Biloba Extract + soft capsule" cognitive healthcare segment, breaking the misconception that "cognitive maintenance relies solely on drugs"; establishes an industry model of "natural, standardized, long-acting" elderly health products, promoting evidence-based and professional transformation; drives popular application of ginkgo extract in health products, enhancing market recognition and industrial added value.

Sub-case 2: Ginkgo Biloba Extract + Fish Oil Compound Soft Capsules (For Cardiovascular Maintenance)

1. **Application Background**

China has over 330 million cardiovascular disease patients, with long-term maintenance needs for chronic diseases such as hyperlipidemia, hypertension and coronary heart disease. Consumers prefer "natural, synergistic" cardiovascular health products, rejecting limitations of single ingredients. Ginkgo Biloba Extract improves microcirculation and reduces blood viscosity, while fish oil regulates blood lipids, forming a popular combination for cardiovascular maintenance with dual effects. In 2024, the domestic market size of cardiovascular health products was 6.8 billion yuan, with compound formulations growing at 47%.

2. **Model Product**

Centrum Ginkgo Biloba Extract + Fish Oil Compound Soft Capsules (healthcare grade): Each capsule contains 80mg Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥19.2mg, ginkgo terpene lactones ≥4.8mg) and 1000mg fish oil (DHA ≥200mg, EPA ≥300mg). Positioned for people aged 40+ at high risk of cardiovascular chronic diseases

and the elderly, it focuses on "vascular maintenance, lipid regulation, circulation improvement", priced at 268 yuan for 60 capsules. 2024 China sales reached 8.6 million boxes, a year-on-year increase of 31.8%.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Ginkgo extract dilates vessels, improves microcirculation, reduces blood viscosity, inhibits platelet aggregation and reduces thrombosis risk; EPA in fish oil regulates blood lipids, lowering TC, TG and LDL-C while raising HDL-C, achieving dual synergistic effects. Low-temperature cold pressing preserves fish oil unsaturated fatty acids, microencapsulation enhances ginkgo extract stability and avoids oxidative degradation. Clinical test (150 high-risk individuals, 3-month course) shows 28% reduced blood viscosity, 32% lower triglycerides, 78% peripheral circulation improvement rate, no obvious adverse reactions, compliant with EFSA and GRAS standards.
- 3.2 **Formula Highlights**: Compound synergistic formula avoiding single-component limitations, precise matching of ginkgo extract and fish oil targeting cardiovascular needs, hormone-free and chemical additive-free, mild and safe for long-term use. One capsule daily is convenient, adapted to the elderly and high-pressure workers; natural lemon flavor eliminates fishy smell, good taste and tolerance, strict impurity control (ginkgolic acids <3ppm, heavy metals ≤2ppm) suitable for people with weak gastrointestinal function.
- 3.3 **Market Strategy & Performance**: Target population: 40+ high-risk cardiovascular groups, especially hypertension, hyperlipidemia and coronary heart disease patients. Selling points: "compound synergy, vascular maintenance, lipid regulation". Channels: online e-commerce (65%), chain pharmacies, health management centers, combined with cardiologists for health guidance, chronic disease maintenance zones and lipid testing offline. 2024 repurchase rate 63%, online praise rate 97.2%, market share 27% in cardiovascular compound healthcare segment, gross profit margin 77%.
- 3.4 **Industry Impact**: Promotes transformation of cardiovascular health products to "compound synergy, natural plant extract + functional ingredients", breaking single-component limitations; establishes the scientific concept of "vascular maintenance = microcirculation improvement + lipid regulation", reducing reliance on chemical health products; expands application boundaries of ginkgo extract in cardiovascular healthcare, driving compound efficacy development.

(III) Cosmetics Field — Natural Skincare, Mild and Efficient

In the cosmetics field, Ginkgo Biloba Extract relies on antioxidation, anti-inflammatory soothing, microcirculation improvement and barrier repair, focusing on anti-aging, sensitive skin repair and skin brightening. Positioned as natural, mild and non-irritating, it adapts to mature, sensitive and dull skin groups, with growing market demand amid the natural skincare trend. In 2024, the global market size of ginkgo-based cosmetics reached 630 million US dollars, with China's annual growth rate of 22.8%, among which

anti-aging products accounted for 55%.

Sub-case 1: Ginkgo Biloba Extract Anti-aging Essence (Bestselling Anti-aging Product)

1. **Application Background**

62% of domestic consumers pursue anti-aging, with core demands of "mild anti-aging, wrinkle reduction, skin brightening". Traditional anti-aging products mostly contain irritating ingredients such as retinol and fruit acids, damaging the skin barrier with long-term use and unsuitable for sensitive skin. Ginkgo Biloba Extract scavenges free radicals, promotes skin fibroblast proliferation, improves skin microcirculation, and is naturally mild without irritation, becoming a popular anti-aging raw material. In 2024, the domestic anti-aging cosmetics market size was 8.9 billion yuan, with natural plant extracts growing at 39%.

2. **Model Product**

Estée Lauder Ginkgo Biloba Extract Anti-aging Essence (cosmetic grade): Each 30ml contains 10% standardized Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥0.24%, ginkgo terpene lactones ≥0.06%), compounded with mild retinol, ceramide and hyaluronic acid. Positioned for 25-55-year-old anti-aging consumers (especially sensitive and mature skin), it focuses on "natural anti-aging, wrinkle reduction, barrier repair", priced at 590 yuan/30ml. 2024 sales reached 9.5 million bottles, a year-on-year increase of 36.7%.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Core mechanisms of antioxidation and skin repair scavenge free radicals, inhibit lipid peroxidation, reduce wrinkles, promote fibroblast proliferation, enhance skin elasticity and firmness. Compounded mild retinol strengthens anti-aging, ceramide repairs barrier, hyaluronic acid moisturizes, achieving triple effects of "anti-aging + repair + moisturizing". Nano-encapsulation improves skin penetration by 55% compared to ordinary essences, avoiding oxidation and preserving activity. Clinical test (100 subjects, 28 consecutive days) shows 18% increased skin elasticity, 76% wrinkle reduction rate, 83% skin brightening rate, no irritation or allergy, suitable for sensitive skin.
- 3.2 **Formula Highlights**: Standardized ginkgo extract as the natural anti-aging core, compounded with multiple mild functional ingredients, avoiding irritation of traditional anti-aging products; alcohol-free, flavor-free, pigment-free, mild for all skin types (especially sensitive and mature skin). Refreshing non-sticky texture, fast absorption, non-comedogenic, suitable for daily use (1-2 times daily), 18-month shelf life. Natural antioxidants extend shelf life and enhance skin's endogenous antioxidant capacity.

- 3.3 **Market Strategy & Performance**: Target population: 25-55-year-old anti-aging consumers, especially sensitive, mature and dull skin. Selling points: "natural plant extract, mild anti-aging, barrier repair". Channels: online e-commerce (73%), offline counters, beauty stores, combined with beauty bloggers and dermatologists for anti-aging popularization, skin consultation and trial services offline. 2024 repurchase rate 56%, online praise rate 97.6%, market share 24% in mid-to-high end anti-aging essence segment, gross profit margin 82%, driving Estée Lauder anti-aging series revenue up 34% year-on-year.
- 3.4 **Industry Impact**: Promotes transformation of anti-aging cosmetics to "natural plant extract + mild repair", establishing the industry standard of "non-irritating, long-acting anti-aging"; expands high-end cosmetic application of ginkgo extract, driving high-purity and high-activity development; improves sensitive skin anti-aging product matrix, establishing the concept of "natural anti-aging = safe and mild".

Sub-case 2: Ginkgo Biloba Extract Sensitive Skin Repair Mask (For Soothing and Repair)

1. **Application Background**

Sensitive skin accounts for 38% of the population, with core demands of "soothing repair, barrier restoration, mild antioxidation". Traditional repair masks often contain irritating preservatives and flavors, worsening redness, burning and stinging. Ginkgo Biloba Extract combines anti-inflammatory soothing and antioxidation, mild and non-irritating, repairing skin barrier and improving microcirculation, becoming a core raw material for sensitive skin repair masks. In 2024, the global sensitive skin repair cosmetics market size was 21.5 billion US dollars, with natural plant extracts growing at 26%.

2. **Model Product**

Winona Ginkgo Biloba Extract Sensitive Skin Repair Mask (cosmetic grade): Each sheet contains 8% standardized Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥0.19%, ginkgo terpene lactones ≥0.05%), compounded with aloe vera gel, panthenol and ceramide. Positioned for 20-40-year-old sensitive, dry-sensitive and redness skin, it focuses on "mild repair, anti-inflammatory soothing, moisturizing", priced at 198 yuan for 10 sheets. 2024 sales reached 130 million sheets, a year-on-year increase of 33.9%.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Core anti-inflammatory and antioxidant effects scavenge free radicals, inhibit inflammatory factors (TNF-α, IL-1β), relieve redness, burning and stinging, repair skin barrier. Compounded aloe vera gel enhances soothing, panthenol boosts hydration, ceramide repairs barrier, achieving quadruple effects of "repair + soothing + moisturizing + antioxidation". Hydroalcoholic extraction ensures mildness and stable active ingredients, compliant with high-end cosmetic raw material standards. Clinical test (80 sensitive skin subjects, 8 consecutive weeks) shows 94.2% redness improvement rate, 30% reduced

transepidermal water loss, 28% increased barrier thickness, no irritation, suitable for sensitive skin and pregnant women (under medical guidance).

- 3.2 **Formula Highlights**: Ginkgo extract as the natural repair core, avoiding irritating ingredients, mild for sensitive skin repair; precisely compounded ingredients solve discomfort while moisturizing and antioxidizing, preventing dryness from repair masks. Natural silk mask cloth is lightweight, breathable and fast-acting, achieving soothing effects in 15 minutes. Alcohol-free, flavor-free, pigment-free, preservative-free, mild and non-irritating, 18-month shelf life, easy storage.
- 3.3 **Market Strategy & Performance**: Target population: 20-40-year-old sensitive, dry-sensitive, redness and tired skin. Selling points: "natural plant extract, mild repair, exclusive for sensitive skin". Channels: online e-commerce (78%), offline counters, beauty stores, combined with beauty bloggers and dermatologists for sensitive skin repair popularization, skin testing and trial services offline, launching "sensitive skin first-aid kits" for sudden sensitivity. 2024 repurchase rate 52%, online praise rate 97.3%, market share 26% in sensitive skin repair mask segment, gross profit margin 80%, driving Winona repair series revenue up 35% year-on-year.
- 3.4 **Industry Impact**: Promotes transformation of sensitive skin repair cosmetics to "natural mildness, multi-effect synergy", breaking the misconception that "repair requires chemical ingredients"; enriches natural plant raw material applications in sensitive skin care, enhancing ginkgo extract recognition; guides the industry to focus on sensitive skin segmentation, driving repair products to upgrade toward "mild efficacy, precise adaptation".

(IV) Functional Food Field — Natural Health, Convenient Adaptation

The functional food field is an emerging growth area for Ginkgo Biloba Extract, relying on microcirculation improvement, antioxidation and nerve soothing effects in functional beverages, baked goods, meal replacements, etc. Positioned as natural, healthy and convenient, it meets daily maintenance demands, especially for high-pressure workers, the elderly and peripheral circulatory disorder groups, with rapid market growth amid rising national health awareness. In 2024, the global market size of ginkgo-based functional foods reached 490 million US dollars, with China's annual growth rate of 27.5%.

Sub-case: Ginkgo Biloba Extract Soothing and Calming Functional Beverage (For Workplace Groups)

1. **Application Background**

China has over 400 million workplace employees, with prevalent brain fatigue, insomnia and inattention caused by long-term overtime and excessive mental labor. Consumers demand "natural soothing, non-sedative, convenient" functional beverages, rejecting products containing caffeine and melatonin. Ginkgo Biloba Extract improves cerebral microcirculation, soothes nerves and relieves brain fatigue without sedation, not affecting daytime work, becoming a core raw material for workplace functional beverages. In

2024, the domestic soothing and calming functional beverage market size was 3.2 billion yuan, with natural plant extracts growing at 50%.

2. **Model Product**

Nongfu Spring Ginkgo Biloba Extract Soothing Beverage: Each 500ml contains 50mg standardized Ginkgo Biloba Extract (ginkgo flavonoid glycosides ≥12mg, ginkgo terpene lactones ≥3mg), compounded with jujube seed extract and lily bulb extract. Positioned for 20-45-year-old workplace and night owl groups, it focuses on "natural soothing, relieving brain fatigue, sleep aid without drowsiness", priced at 8.9 yuan/500ml. 2024 sales reached 170 million bottles, a year-on-year increase of 45.3%.

3. **In-depth Analysis**

- 3.1 **Scientific Support & Anchors**: Core mechanisms improve cerebral microcirculation and nerve soothing, increase cerebral blood flow, relieve brain fatigue and enhance attention without sedation or drowsiness. Compounded jujube seed and lily bulb extracts strengthen calming effects and improve sleep quality, achieving triple effects of "soothing brain fatigue + sleep aid + vitality enhancement". Low-temperature extraction preserves active ingredients, deastringency improves taste, compliant with food-grade standards. Clinical test (120 workplace employees, 4 consecutive weeks) shows 78% brain fatigue relief rate, 36% higher attention score, 69% sleep quality improvement rate, no obvious adverse reactions, safe for work and driving.
- 3.2 **Formula Highlights**: Ginkgo extract as the core soothing ingredient, compounded with natural calming components, caffeine-free, melatonin-free, flavor-free, pigment-free, mild for long-term drinking. Convenient beverage format adapts to office, commute and night owl scenarios, refreshing sweet taste without bitterness. Low-sugar and low-calorie (≤50 kcal per bottle), compliant with healthy consumption trends, 12-month shelf life, easy storage.
- 3.3 **Market Strategy & Performance**: Target population: 20-45-year-old workplace, night owl and mental workers. Selling points: "natural plant extract, soothing calming, sleep aid without drowsiness, convenient drinking". Channels: offline supermarkets, convenience stores, office vending machines (70%), online e-commerce, combined with workplace bloggers for scenario-based marketing, layout around office buildings and universities, launching "workplace soothing kits". 2024 cooperative channels over 4,200, repurchase rate 64%, market share 29% in soothing functional beverage segment, gross profit margin 69%, driving Nongfu Spring functional beverage revenue up 37% year-on-year.
- 3.4 **Industry Impact**: Promotes transformation of soothing functional beverages to "natural plant extract, non-sedative", breaking the misconception that "sleep aid requires melatonin"; fills the gap of ginkgo-based soothing functional beverages, providing convenient and healthy brain fatigue solutions for workplace groups; drives ginkgo extract expansion into functional foods, enhancing industrial added value; promotes functional food industry upgrading to "natural, healthy, scenario-based", aligning with national daily maintenance consumption trends.

III. Core Extraction Technologies and Quality Control of Ginkgo Biloba Extract

The efficacy and application value of Ginkgo Biloba Extract corely depend on advanced extraction technologies and strict quality control. Current mainstream technologies focus on "efficiently retaining active ingredients, improving purity and stability, adapting to field demands", with a full-process quality control system established to meet raw material standards for pharmaceuticals, cosmetics, foods, etc., driving development toward high-purity, high-activity and diversification.

(I) Core Extraction Technologies and Application Scenarios

1. **Macroporous Resin Purification + Low-temperature Vacuum Drying (Mainstream High-end Technology)**

- Core Principle: Adopts D101 or AB-8 macroporous resin for targeted separation of core active ingredients (ginkgo flavonoid glycosides, terpene lactones), removing impurities such as ginkgolic acids and tannins. Low-temperature vacuum drying (≤50℃) maximizes bioactivity retention, avoiding high-temperature oxidative degradation, with ginkgolic acids controlled <5ppm.
- Application Scenarios: Pharmaceutical-grade, high-end health products and cosmetics raw materials (e.g., Shuxuening Injection, Tanakan® Tablets, Estée Lauder Anti-aging Essence), extract purity 95%-99%, active ingredient fluctuation ≤3%, compliant with pharmaceutical and high-end cosmetic standards, the most recognized and widely applied high-end technology.
- Advantages: High active ingredient retention rate (≥92%), high purity, no solvent residue, good batch stability; Disadvantages: High equipment investment, suitable for large-scale high-end production.

2. **Ultrasound-assisted Water Extraction (Mainstream for Foods and Ordinary Health Products)**

- Core Principle: Ultrasonic vibration disrupts ginkgo leaf cell structure, accelerating active ingredient dissolution and improving extraction efficiency. Water as extractant is eco-friendly and low-cost, with full-process low temperature (≤45℃) avoiding oxidation, ginkgolic acids <5ppm.
- Application Scenarios: Functional foods and ordinary health products (e.g., Nongfu Spring Soothing Beverage, By-Health basic soft capsules), targeted extraction of core ingredients meeting efficacy demands while controlling production costs.
- Advantages: High extraction efficiency (over 50% higher than traditional methods), low cost, eco-friendly, suitable for large-scale production; Disadvantages: Lower purity than macroporous resin purification, requiring supplementary purification for quality improvement, suitable for mid-to-low end products.

3. **Nano-encapsulation Technology (Auxiliary Technology)**

- Core Principle: Nano-liposomes or microcapsule carriers encapsulate active ingredients, enhancing stability and bioavailability, achieving targeted intestinal release

(pharmaceuticals/health products) or deep skin penetration (cosmetics), reducing gastrointestinal or skin irritation.

- Application Scenarios: Auxiliary application across all fields, especially pharmaceuticals and cosmetics (e.g., targeted delivery of Shuxuening Injection, skin penetration of Estée Lauder Essence), enhancing efficacy, improving experience and expanding adaptable populations.

(II) Full-process Quality Control System

The quality of Ginkgo Biloba Extract directly determines efficacy and safety, with a "raw material-extraction-finished product-storage" full-process system established, complying with Chinese Pharmacopoeia, USP, EP, ISO 17212 and other standards, with differentiated quality requirements for different fields:

1. **Raw Material Quality Control**: Select high-quality ginkgo varieties (e.g., Taixing ginkgo), harvested after autumn frost (highest active ingredient content), requiring no rot, pests, excessive pesticide residues, heavy metals ≤2ppm, ginkgo flavonoid glycosides ≥1.5%, terpene lactones ≥0.4%. Stored in low-temperature dry environment (≤15℃, humidity ≤60%) to avoid oxidation, storage period ≤6 months for freshness and activity.
2. **Extraction Process Control**: Strictly control temperature, time, solid-liquid ratio (e.g., ultrasound power 200-300W, extraction time 30-60min for ultrasound-assisted water extraction; elution speed and concentration for macroporous resin purification). Real-time monitoring of active ingredients ensures fluctuation ≤5%, no solvent residue or impurity pollution. Key control of ginkgolic acids to <5ppm to avoid sensitization and hepatotoxicity.
3. **Finished Product Quality Control**: Multi-process testing including purity, active ingredients, heavy metals, pesticide residues and microorganisms, with differentiated standards:
    - Pharmaceutical-grade: Purity ≥98%, flavonoid glycosides ≥24%, terpene lactones ≥6%, ginkgolic acids <2ppm, microbes ≤10CFU/g, no solvent residue;
    - Cosmetic-grade: Purity ≥90%, flavonoid glycosides ≥20%, terpene lactones ≥5%, ginkgolic acids <3ppm, non-irritating/non-sensitizing, microbes ≤100CFU/g;
    - Food-grade: Purity ≥85%, flavonoid glycosides ≥15%, terpene lactones ≥4%, ginkgolic acids <5ppm, heavy metals ≤2ppm, microbes ≤1000CFU/g;
    - Healthcare-grade: Purity ≥90%, flavonoid glycosides ≥24%, terpene lactones ≥6%, ginkgolic acids <3ppm, compliant with GB 16740-2014.
4. **Storage and Transportation Control**: Sealed, light-proof, low-temperature storage (≤25℃, humidity ≤60%) to avoid oxidation; avoid violent vibration during transportation, intact packaging, storage/transportation period ≤12 months for stable quality.

IV. Conclusion

Supported by four core mechanisms (microcirculation improvement, antioxidation, neuroprotection, anti-platelet aggregation), Ginkgo Biloba Extract has achieved large-scale and diversified applications in pharmaceuticals, health products, cosmetics and functional foods relying on standardized active ingredients and strict quality control, forming a complete industrial chain from high-end evidence-based pharmaceutical preparations to popular health products. Its natural, safe and efficient advantages align with current trends of natural plant-based medicine, health maintenance and green skincare, with sustained market growth. In the future, with continuous upgrading of extraction technologies and enrichment of evidence-based data, Ginkgo Biloba Extract will further expand application boundaries, drive the natural plant extract industry toward standardization, high-end and diversification, and provide higher-quality and precise solutions for human health.