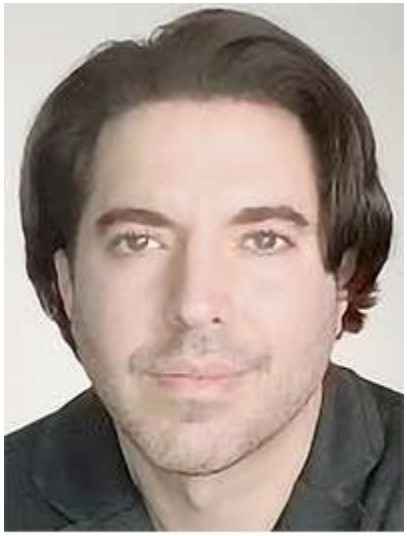
MII MEDICAL INSIGHT Aesthetic Insigh
May 13, 2025 SUBSC

Experts Urge Standards as Exosome Hype Outpaces Clinical Evidence

Exosome therapy, celebrated as a breakthrough in regenerative aesthetic medicine, faces controversy as questionable products flood the market. Promises of cellular rejuvenation mask an under-regulated industry filled with unverified claims and inconsistent safety standards. Many practitioners, captivated by the buzz around exosomes, overlook essential scientific scrutiny, leading to unproven treatments in the market. Enthusiasm often outweighs scientific validation in this rapidly developing field.



Thomas M. Hitchcock, Ph.D
Chief Innovation Officer
Revance

"It's frankly unsettling," says Thomas M. Hitchcock, Ph.D., Chief Innovation Officer at Revance. (Johnson City, Tenn.). "It's like a cardiologist prescribing a blood pressure drug without knowing how it works — just because a company says it's effective. This kind of blind trust is irresponsible yet challenging to address because many physicians are already buying into the hype." He points to gaps in regulation and concerns that many exosome products may not even contain what they claim. "We're seeing issues similar to recent studies on supplements, where actual ingredients are far from what's advertised. This also raises serious questions about the safety and efficacy of many exosome products."

As of 2025, the U.S. FDA continues to classify exosome therapies intended for treatment as biological drugs, requiring an Investigational New Drug (IND) application for clinical use. This means that any provider offering injectable or systemic exosome treatments without IND approval is operating outside legal boundaries. Recent investigations from independent labs

have shown that several well-marketed exosome products contained primarily extracellular vesicles or cellular debris, rather than purified exosomes, adding urgency to calls for regulatory reform.

Mesenchymal-derived exosomes (MSCs), commonly sourced from bone marrow, adipose tissue, chorionic membrane, and umbilical cord, are cell-derived vesicles with the ability to self-renew and differentiate. “They carry over 1,000 signaling proteins, growth factors, cytokines, and genetic material — messenger RNAs (mRNAs) and microRNAs (miRNAs). These are two types of RNA molecules that play crucial roles in gene expression and cellular function that regulate cell growth, differentiation, and apoptosis,” stated Gordon Sasaki, M.D., F.A.C.S., a Pasadena, Calif.-based plastic surgeon and leading researcher in regenerative aesthetics. “Exosomes may also influence gene expression without altering the DNA itself, which can contribute to anti-aging effects. Structurally, exosomes are like liposomes, with a bilayer membrane that mimics human cell surfaces, aiding in cellular communication and integration.”

Common sources of MSCs include bone marrow, adipose tissue, chorionic membrane, and umbilical cord (Wharton’s Jelly). Conditioned media, the nutrient-rich solution where cells are cultured, plays a key role in exosome production. These media become enriched with exosomes, signaling proteins, and growth factors, enhancing its regenerative potential. However, some companies market “enriched conditioned media” without fully isolating the exosomes, leaving behind other cellular debris or non-exosome material. True exosome purification is a more rigorous process that ensures only exosomes are present, making the product more effective and targeted. While conditioned media can be beneficial, it lacks the purity and specificity of fully purified exosome products. Products labeled as “exosome-enriched” often vary widely in composition, with some showing little to no regenerative activity due to insufficient exosome concentration.

Meanwhile, platelet-derived exosomes, extracted from blood platelets, are emerging as a convenient, DNA-free alternative for topical applications. Platelet exosomes, unlike MSCs, come from blood platelets, which are fragments of bone marrow cells. Since platelets lack DNA, they avoid issues of DNA instability during production. Storing these exosomes at room temperature also adds convenience for various treatments. However, room-temperature “stability” claims may be exaggerated unless the products have undergone rigorous stability testing and use advanced preservation methods.

Steven R. Cohen, M.D., F.A.C.S., Medical Director at FACES+ Plastic Surgery (San Diego, Calif.), noted, “In aesthetics, exosomes support tissue repair, regeneration, and anti-inflammatory effects. They essentially ‘upload new software’ to cells. Researchers demonstrated this concept in a study published in Nature, where young and old mice shared circulatory systems and exchanged cellular signals,

causing the older mouse's organs to rejuvenate while aging the younger ones. This cellular communication is at the heart of how exosome therapy might benefit aesthetics."

Manufacturers frequently use the term exosome loosely without recognizing that exosomes vary significantly in function. "For example, even cancer cells produce exosomes, so would you really want to use exosomes without knowing what's inside?" said Dr. Hitchcock. "These tiny packages could contain harmful substances just as easily as beneficial ones. Marketers have taken a complex concept from cell biology and pushed it assuming it's good, much like how they often advertise peptides or growth factors. Using these broad labels without understanding the specifics is irresponsible. Clinicians need to know exactly what exosomes they're dealing with before they can safely and confidently use them. Without that knowledge, how can you trust their use in patient care?"

Alisa Lask
CEO, Rion Aesthetics

Alisa Lask, CEO of Rion Aesthetics (Rochester, Minn.), warned how the exosome market risks following stem cells down a similar troubled path. "When stem cells became a buzzword, questionable products flooded the market, damaging the industry's reputation," she said. "If exosomes go down that route, it could negatively affect the entire sector. Without standard release criteria, the market is vulnerable to companies selling unproven products. The lack of standardization in exosome production presents serious safety risks. We need an industry-wide consensus on production and quality standards." To that end, the International Society for Cell & Gene Therapy (ISCT) launched a 2025 task force to draft guidelines for exosome characterization, dosage, and clinical application standards.

Practitioners should be wary of red flags and ask critical questions, noted Dr. Hitchcock. "Physicians should know that the FDA has warned against introducing exosome-based products systemically. For example, while FDA-approved microneedling devices state they're not for transdermal delivery, some practitioners use them to inject exosomes, leading to adverse events. We've seen cases of cellulitis, tissue necrosis and granulomas from needling these products. When asked, some practitioners cite company claims, but there's no data to back them. It's dangerous to accept unvalidated practices based on marketing alone." He added, "They should ask how these products work, and what data supports their efficacy. If they can't answer these questions, patients shouldn't be exposed

to these products. Many consumers simply trust their physician without asking questions, which can backfire."

Dr. Cohen observed that even legitimate companies often lack peer-reviewed clinical trials to substantiate their claims. "Some have conducted studies, but they're mostly lab-based, not true peer-reviewed clinical studies, which can take years to complete. True peer-reviewed clinical studies would significantly reduce controversy, as validated science would explain why certain exosomes can be used for specific purposes and why one cell type might be more effective for one treatment than another. The genuine issue is that many of these companies are unwilling to do this research because it's a gamble — if they show that there's no benefit or there's no consistency, then they've shot themselves in the foot."

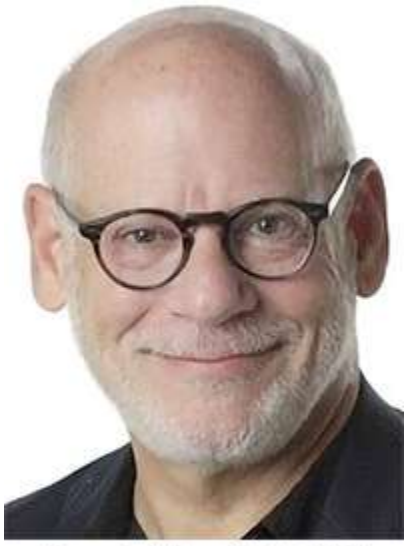
As such, the exosome market is still in its early stages, requiring providers to exercise due diligence in selecting products. Key considerations include the MSC source, safety profile, purity, dosage, reproducibility, anti-inflammatory characteristics, and stability. Limitations on storage and handling are also essential factors. Recent research suggests that inconsistent storage practices may compromise bioactivity in over 40% of products labeled as "clinical-grade" exosomes.

"Sourcing is critical for anyone using human-derived ingredients," reported Ms. Lask. "There are varying opinions on what are the best sources, but sourcing significantly affects product safety. Key concerns include the frequency of cell manipulation and the transfer of DNA during the process. When considering a source, ask: what's happening in the lab? How many alterations has the material undergone before reaching you? These factors are crucial for evaluating safety and integrity."

Ethical and religious concerns also arise over stem cell and exosome sourcing, said Ron Borsheim, former Senior VP of Business Development at Benev Skincare (Mission Viejo, Calif.). "Contamination is a real risk, especially with umbilical cord, Wharton's Jelly, and placenta sources, which may get transported from hospitals with poor sterility. Adipose tissue and bone marrow are 'closed systems,' and less susceptible to contamination. But the bigger issue is not just sourcing; it's the validation of the manufacturing and development process. Using the best ingredients doesn't guarantee quality if the process or expertise is flawed. It's like having top ingredients without a good recipe or chef."

Many exosome sources, such as umbilical cords, originate from tissues that are otherwise discarded and rarely raise any ethical concerns. "However, not all companies operate ethically," claimed Dr. Hitchcock. "While ethical methods exist for sourcing cell cultures, it's crucial to ask if companies are following the proper procedures to produce a safe product. Are they screening cells adequately for

infectious diseases? Are they isolating what they claim? These are key ethical and quality questions."


Steven R. Cohen, M.D., F.A.C.S.

In the push to unlock exosomes' potential, researchers face the complex challenge of engineering these cellular "messengers in a bottle" to deliver targeted treatments, an innovation that could transform medicine if they overcome technical hurdles. "Engineering exosomes for specific tasks is extremely complex," said Dr. Cohen. "Each exosome can contain up to 1,200 microRNA particles essential for cell signaling. Identifying and selecting specific microRNAs within exosomes to target functions like skin repair or organ regeneration is highly challenging."

Exosome purification and storage are crucial for maintaining efficacy, though some companies misleadingly claim "shelf-stable" exosome products. Exosomes, as delicate vesicles containing proteins, RNAs, and other biomolecules, require strict storage conditions to preserve structure and bioactivity. "The purification process requires validation," expressed Mr. Borsheim. "Some companies promote enriched conditioned media, but true purification is a lengthy, convoluted procedure. Products claiming shelf stability often require preservatives, which are not ideal for application on freshly treated skin post-laser or microneedling."

Dr. Hitchcock agreed, adding, "Some products claiming to contain exosomes actually don't. Whatever's 'stable' in those formulations, it's not exosomes. To make exosomes shelf-stable would require advanced preservation methods, as they're not naturally designed to last on a shelf. Genetic material and proteins degrade over time without specific treatment. While some companies may claim stability, I haven't seen evidence supporting these claims. In fact, we found that some well-known exosome products did not contain exosomes, but extracellular vesicles. These can incorporate elements like lysosomes, which aren't always beneficial. If companies truly produced exosomes, their products would meet specific size and shape standards, with quality checks ensuring consistency."

The ISCT's draft guidance released in March 2025 calls for more transparent chain-of-custody documentation and sterility testing for all exosome materials derived from perinatal tissue sources.

The lack of standardization in exosome production and dosing questions presents safety risks, as inconsistent concentrations and purity can lead to unpredictable outcomes. To address these issues, the FDA is working to establish guidelines that require manufacturers to validate exosome content, purity, and efficacy through

standardized testing and clinical trials. This will ensure that exosome therapies meet safety and efficacy standards before reaching the market. This includes an early framework for topical exosomes used in cosmetics, which are currently exempt from drug regulations but under review as part of the 2025 Modernization of Cosmetic Regulation Act (MoCRA) enforcement rollout in the U.S.

“Currently, all we have are cosmetics, which don’t involve dosing like therapeutic products,” said Ms. Lask. “There’s no set therapeutic dose in cosmetics, but concentration is still essential. For exosomes to benefit the skin, they must be present at a certain level and remain intact. The FDA approval process will be pivotal in regulating exosomes for therapeutic use, ensuring that any company seeking approval shows consistent dosage and proof through trials that the product’s benefits outweigh risks. That’s why we should wait for FDA approval before injecting exosomes.”

Exosome-based topicals claiming therapeutic effects should raise red flags, according to Dr. Sasaki. “If something sounds too good to be true, it likely is. It’s crucial to evaluate the science behind claims. Look for companies that publish peer-reviewed studies with multiple patient trials and consistent results. The focus should be on single-product testing, not mixing different modalities, so you can clearly see the proven effects and thorough transcript testing.”

Dr. Cohen emphasized that rigorous science is essential. “Transcript testing in exosome production examines RNA content to identify active gene expression,” he explained. “This testing reveals mRNAs and miRNAs in exosomes, providing insight into their functions and therapeutic effects. Physicians who are data-driven should seek companies prioritizing scientific validation before commercialization. We’ve tested products from many companies that didn’t even contain exosomes, so it’s truly ‘buyer beware.’”

"Physicians should seek companies prioritizing scientific validation before commercialization. We’ve tested products that didn’t even contain exosomes, so it’s truly ‘buyer beware.’"

Regulatory prohibitions have led to the ban on human-derived exosomes in several countries, including Japan and most of the E.U., causing some companies to resort to using plant-derived exosomes. “Plant exosome-like nano vesicles have structural and functional similarities to human exosomes,” said Dr. Sasaki. “While studies show these exosomes can perform certain functions, it’s unclear how they interact with mammalian cells. Limited proteomic analysis makes it challenging to understand growth factor and cytokine levels.” Starting in early 2025, new trials in South Korea and Germany are investigating the cosmetic safety profile of plant-

derived exosomes, particularly from grapes and green tea, which show promise in antioxidant support and inflammation reduction.

One should not immediately discount plant-based exosomes, noted Dr. Hitchcock. “I often see exosome companies criticize plant exosomes while promoting their own products with no solid evidence. People have used botanicals as medicine for generations. Do I believe plant-based exosomes are useful? Not without proper research to back it up. But if the research is there, then there could be something to it. After all, botanicals have proven value, and it’s possible that exosomes play a role in that. We just don’t know yet.”

Ultimately, exosome technology holds promise for transforming aesthetic treatments with a powerful, cell-free approach for targeted regenerative effects. “Topical exosomes offer incrementally greater potency than cellular therapies for skin and hair treatments,” stated Dr. Sasaki. “In the future, they may allow targeted, stable therapies that provide anti-inflammatory, epigenetic, and regenerative benefits as standalone or complementary treatments.”

To reach that future, it is critical to understand the science behind exosomes before fully embracing their use, cautioned Ms. Lask. “This is a growing field, and we’ll continue to learn. Exosomes won’t be a cure-all, but as research advances, we’ll find their optimal uses. Ongoing education about human-derived ingredients is essential, as advances now let us harness the body’s natural healing power. Staying informed and asking the right questions ensures safe, effective options for patients.” She added that with improved regulatory clarity and responsible innovation, exosomes may eventually rival neurotoxins in market scale and impact.

Mr. Borsheim added, “If we develop exosomes correctly, they could have as much impact on aesthetics as neurotoxins. But success depends on responsible development. The exosome market segment always seems one step away from regulatory crackdowns because of companies making false claims and skirting regulations. Exosomes have a promising future, but the path forward requires effective leadership and standards. But I believe they have a promising future, in which we may see specialized exosomes for a wide range of conditions.”

Please feel free to contact us directly at: info@miinews.com