



Midlife Clarity with Dr. Tracy Page

"Clarity Changes Everything"

Hosted by Dr. Tracy Page
Episode #16 — The Glow Peptides

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[00:00] Hi, I'm Dr. Tracy Page, and welcome to Midlife Clarity. We have clarity. I think everything is different because you know what to do. You have the information that you need. And if this is your first time to the podcast, well, we're almost finishing up our series on peptides. And if you're a woman listening, this peptide is for you. And I can't wait to share it with you. And for those of you who've been listening, well, thank you for coming back and listening again.

[00:26] Okay, this has happened to pretty much almost every patient in my practice, because I treat a lot of women in midlife. You look at the picture, and you're like, I don't recognize her. Who is that woman? You don't look the same. Your skin doesn't glow the same. Your hair is thinner. It happens. It doesn't matter who you are. I would say death, taxes, and menopause- like aging, it happens.

[00:51] And I don't think there's a woman that I've treated, or most women I've treated, who don't have this thought at some time. And so I'm going to talk to you about a patient today. I'm going to call her Kathy or Kathleen. And I'm going to talk to you about what she was complaining about. And I will tell you there isn't a week that doesn't go by that this topic does not come up with a patient. I would say probably 20 patients a week. Okay. So what am I talking about, and what's the peptide? We're going to talk about GHK, and there's a little hyphen, CU, and KPD. So the skin, hair, and inflammation peptide, or peptides, because there's more than one. Okay, so Kathleen, she's 50. She came into my office with a question I have heard a hundred times in different forms. Seriously, a hundred times. But the way she asked it, it kind of stayed with me, and that's why I used her as my example. She put her phone face up on my desk, or I would say my mobile desk.

[01:51] She opened a photograph from her daughter's wedding two months earlier and said, I don't know who that woman is. Have you ever thought that? You don't know who that woman is? Of course, it was Kathleen. But her hair, her dress, her smile, her arm around her new son-in-law. So of course, that was her. And she knew it was her. But what she didn't recognize and what she could not stop looking at was the way her skin looked under the photograph lighting. And remember, the pictures are usually touched up, right? The way her part appeared very clearly in her hairline, the way the laugh lines around her eyes seemed to have deepened in the past few years, is what she pointed out to me. Also her jowls; she really did not like how they looked. She had felt fine in the

moment of the wedding, of course. She was super excited, and she thought she looked fine, but when she looked at the photograph, she just said, again, I don't know who that woman is. Like, I don't recognize her. She doesn't look like how I feel. And I've always had this funny saying: I hate to look better than I feel, but when you feel good, you want to look good, right? It makes sense.

[02:59] So I'm going to tell you about Kathleen's last decade of her life that she shared with me. So she developed eczema in her late 30s. After her second pregnancy, this occurred. It came and went in flares. Her hands, the inside of her elbows, and occasionally her chest. And she had seen her dermatologist and had been given her a topical steroid cream that worked beautifully for the first few years. And it does help. By her mid-40s, she was using it actually more frequently. And the flares were coming back faster and faster between treatments. By 48, her skin was thinning. And I actually realized this myself. I used a really great cream. I'm going to diverge here for a minute. It was a great, great cream that I received from one of our compounding pharmacies to help with hyperpigmentation and the texture of your skin, everything. And it does thin the skin when there's a steroid in it. So I've experienced this myself. And I thought, oh my gosh, I can see my blood vessels. But it was actually my skin was thinning. So it can be good. It's a good product when it has a steroid in it. It really helps with hyperpigmentation and skin inflammation.

[04:06] But you can't use it all the time. And honestly, it's treating the outside, not inside what's really happening. We're going to talk about that. Okay. So her dermatologist gave her this cream. And like I said, she was using it. But by age 48, her skin was thinning. The steroid cream still worked, but left her skin paper-thin in spots where she had been using it the longest. Her hair began thinning around age 47.

[04:30] It was subtle at first. More strands in the shower drain than used to be. And I've experienced this one too. But by 49, her ponytail was visibly thinner. I can't tell you how many women show me their ponytail. I mean, it is a common thing. Or they'll bring actually their hair from the shower in a baggie and show it to me because they're losing so much hair, right? So what did she do? She tried minoxidil, and it helped.

[04:52] And you could do minoxidil cream on your scalp or foam. You can get that over the counter. It's called Rogaine. You can try minoxidil oral. And actually, I've had a lot of patients have really good results with minoxidil oral. So it did help her. She tried adding biotin. And I would tell you, most women are not short in biotin. But if you are deficient, biotin can be very helpful. She tried collagen powders.



[05:17] I'm a huge fan of collagen because we make less of it as we age. So taking it in every day is great. She used scalp serums, hair growth shampoos, you know, all the things. Nutrafol, Wellbel, like all the things. And some of those things are great. I use some of those things. But they only helped her marginally. They did not reverse anything. Her skin had changed throughout the same window, so that dewy, even-toned skin in your 40s, even your 30s, and even younger, had been replaced by something duller, drier, and honestly less responsive. Her wrinkles around her eyes- I think some wrinkles as we age are gray. I mean, you do smile, right? You do laugh, so you should have some. But they're around her eyes, and her forehead had really deepened, and we don't like those really deep crevices, and that's what she was getting.

[06:04] A small scar from her childhood, who was almost invisible at 40, had started to become more visible. Her wound healing had slowed. And a paper cut, like I said in our other podcast series, her paper cut took twice as long to close and to heal. Small bruises lasted twice as long as it should have. She had spent thousands of dollars on skincare, retinols, hyaluronic acid serums, vitamin C serums, peptide-label creams from department stores. And yes, like I said, some of it worked, but most of it was underwhelming. None of it reversed what she was seeing in her daughter's wedding photos. So this leads me to what we're going to talk about today. Here is what she doesn't know. By the time you turn 60, your body produces approximately 60% less GHK-CU, the master copper-binding peptide that controls collagen synthesis.

[06:59] Her hair follicle health, wound healing, and the gene expression of patterns of young skin. And that 60% is less than you produced at 20. From roughly 200 nanograms per milliliter at age 20 to about 80 nanograms per milliliter at age 60. The peptide that told her skin and her scalp how to behave like young tissue had been quietly fading from her bloodstream for three decades. And no skincare product on the market, no matter how expensive, no matter how well marketed, has been able to fully restore the signal from the outside. Because remember, this is an inside problem. Today, we're going to talk about GHK-CU and a related peptide called KPV. The peptides that are quietly transforming what I feel is regenerative dermatology or regenerative aesthetics.

[07:50] The peptides that, in Kathleen's case, often produce really visible changes that 10 years of conventional skincare can't really deliver. Today we're going to walk you through what GHK-CU actually is and why your body has been making it your entire life. And this is what I love about peptides. Our body makes these. Like, we're just putting in something our body already makes, and we're just turning it on. Turning on that light



switch. It's really impressive, with evidence on collagen synthesis, hair growth, and wound healing. KPV, the small but mighty anti-inflammatory peptide, addresses the eczema, rosacea, and chronic inflammatory skin conditions that GHK-CU alone can't really resolve or fully resolve. So these two peptides are foundational, and they're really serious regenerative aesthetics, I would say, in our protocols. And there is a distinction between these two peptides, and we'll go through that today.

[08:44] So by the end of this episode, you'll understand why Kathleen did not recognize the woman in the wedding photos. And what we did to bring back that woman she did recognize. And I'll tell you, I am so glad I know about these peptides because I feel like they have helped me age gracefully. Being 60 is not easy. When you feel good on the inside, you want to look good on the outside, and none of us can be aging. It happens, but we can age gracefully. And that's what I think these peptides do. Okay. So let me tell you about a peptide that was first isolated from human plasma in 1973 by a researcher named Dr. Lauren Pickard. So Lauren Pickard and the experiment that started everything we know about it. So Dr. Pickard was studying liver cells. He had taken liver cells from like older donors and was watching how they behaved, the kinds of proteins they made, the patterns of cellular activity that they created. So these liver cells, they behave like the older cells they were. Then he added plasma from young donors to the same liver cells, and something remarkable happened. The older cells started making proteins more characteristic of the younger cells, or the younger donors. They started behaving younger. Picard isolated the active component from the young plasma, and guess what it turned out to be? A three-amino-acid peptide, glycine, histidine, and lysine, bound to a copper atom, and it's called GHK, and there's a hyphen, see you. This is one of the most extraordinary findings in regenerative biology. It tells us something important about aging that the cosmetic industry has spent 50 years working around, not with. Aging at the cellular level is partly a problem of signaling. Young plasma has signals that your cells use.

Old plasma has lost some of those signals. When you add the missing signal back, the cells respond. Not because the cells became young, but because they finally got the message they're missing. That's pretty amazing, right? So what does GHKCU actually do? So it's found throughout the body. It's in your plasma, your saliva, your urine, your skin, your hair follicles. It's crazy. It's in all those places. Your body produces it on its own. It serves as a small copper carrier that delivers copper to the enzymes and pathways that need it for tissue repair. They also use it for collagen synthesis and antioxidant defense. Copper is an essential cofactor for many of these processes. GHK-CU is the

messenger peptide that gets the copper where it needs to go. And the mechanism is generally, I would say, generally unusual. Most peptides we have discussed throughout the peptide series are receptor-binding. They bind to a specific receptor.

[11:31] The receptor triggers a cascade of events. The cascade produces a single class of effects, okay? GHK-CU does that, but it also does something more. It modulates gene expression directly. In studies of aged skin cells exposed to GHK-CU, the gene expression profile shifts towards patterns that resemble younger cells. Genes from collagen synthesis are upregulated. Genes from elastin and decorin are unregulated. Genes for inflammatory cytokines are downregulated. Genes for matrix metalloproteinases, enzymes that break down extracellular matrix and contribute to skin aging, are balanced rather than overactive.

[12:15] The 2018 review by Pickard and colleagues described GHK-CU as one of the few molecules with the ability to reset cellular function and reset it toward a younger profile. Based on consistent evidence from cell structure, animal, and human studies. It's pretty amazing. Okay, so most skincare ingredients are like what I call paint. They sit on the surface, change the appearance, and require constant reapplication. GHK-CU is more like a locksmith who reprograms the safe. It does not just change what is visible; it changes the instructions printed on the cellular blueprint. The gene expression patterns that determine which proteins your cells make and which ones they don't. When the blueprints are updated, the cells follow them.

[13:04] The result is not paint on top of aged skin. It's younger skin building itself from the architecture up. Kind of like when we talk about Neogen, Neogen stimulates the skin cells deep within, and then you pair this with the GHK-CU. It makes that procedure work even better because now the skin cells have what they need to, actually, change their architecture to become younger and more vibrant. Okay, the numbers on what you need to know in life. GHK-CU levels in human plasma decline measurably with age, approximately 200 nanograms per milliliter at age 20. By age 60, that has fallen to about 80 nanograms per milliliter, a 60% decline, just like I said earlier. This decline tracks closely with everything we observe externally. Loss of skin elasticity, slower wound healing, thinning of the skin and hair, reduced responses to injury, and the visible markers of age tissue.

[14:01] We all know what that looks like when we look in the mirror. Causes synthesis declines about 1% per year after age 25, with an additional 30% loss in the first five years after menopause. I said that on the last episode: 30% loss in the first five years after menopause, and that's collagen. This is partly a consequence of declining estrogen,

which we talked about earlier in the other podcast, but it also is a consequence of declining GHK-CU. The two trends are not independent. They reinforce each other. Restoring estrogen helps, so you have to take care of that part too. Restoring GHK-CU helps too. Doing both together is meaningfully more powerful doing either one alone. Skin thickness declines as collagen declines. Wound healing capacity declines. Hair follicle activity declines. Pigmentation regulation becomes less precise.

[14:54] The same cascade that causes the visible changes Kathleen saw in her wedding photo is happening to all of us, millions of women, mostly silently, and almost no one is being told that there is measurable peptide deficiency at the center of it. So the peptides play a huge role in being able to reverse this - GHK is the peptide. Copper is the key it carries. Without the copper, the peptide is just three amino acids in a row, mechanically inert, biologically quiet. The copper atom is what makes the peptide function because copper is a central cofactor for the enzymes that build collagen and elastin. It's also essential for repairing tissue, and they defend against oxidative damage. And when you have more oxidative damage, you'll see that person gray, they get gray faster, they age quicker. GHK does not just deliver a message, it delivers a key on a chain. Both pieces matter, both pieces are necessary, and both pieces decline together as we age. Okay, GHKCU, how it's used clinically, it can be used in three primary forms, as a topical cosmetic ingredient, where it has been incorporated into serums and creams for decades, and it's where the evidence is strongest in humans, as a topical post-procedure treatment after microneedling, laser resurfacing, or chemical peels, where the wound healing acceleration is pretty meaningful, and is a subcutaneous or intradermal injection in clinical settings, where the systematic and deeper tissue effects can be very pronounced. And you want someone to do it who knows what they're doing, okay? Anesthetics and regenerative protocols are particularly part of why post-procedure outcomes are different and better, especially in functional medicine. When you have the functional medicine component, you know the peptides, and you have the aesthetic component, you put those together, and results can be pretty amazing. So the same molecule that is healing your skin from the inside is also accelerating recovery from the procedures we use to stimulate skin renewal. So again, that's why I said Neogen is great because it stimulates new skin cells. It wakes up your old skin cells and makes them new. And it happens from the inside out. And then you add GHK-Cu, and it accelerates that recovery. So it's pretty, the two together are pretty phenomenal. Okay. Let me introduce you to the second peptide on this episode because GHK-CU and KPV are usually used together. And the reason becomes obvious once you understand what KPV actually does in the body. So it's a

tripeptide; KPV is just three amino acids: lysine, proline, and valine. It is a fragment of a larger hormone called alpha-melanocyte-stimulating hormone, or alpha MSH. Alpha MSH is one of the most potent natural anti-inflammatory molecules in the human body. It is involved in pigmentation, in inflammation control, in immune balance, and mood regulation. So it has a remarkably broad set of functions for just a single hormone, okay? So again, KPD is a tripeptide, three amino acids, glycine-proline family. It's a fragment of a larger hormone called alpha melanocyte stimulating hormone, or alpha MSH, okay? Alpha MSH is one of the most potent natural anti-inflammatory molecules in the human body. It is involved in pigmentation because you have post-inflammatory hyperpigmentation that can happen, inflammation control, and immune balance. It also regulates mood, okay?

[18:26] Research discovered the C-terminal 3-amino acid fragment of alpha-MSH, the KPV sequence, retained almost all of its parent hormones, like the anti-inflammatory power, while shedding most of its other effects. Even more interesting, KPV exerts these effects not exclusively throughout the melanocortin receptor pathway, but also through a separate direct interface with an inflammatory transcription factor. We call that NF-kappa-B. Okay. NF-kappa B is what I call the master regulator of inflammatory gene expression in nearly every cell type in the body. So if your brain is spinning right now because I'm using all these different terms, don't worry about it. I'll get to something that's pretty straightforward.

[19:10] So what does KPV actually do? It calms inflammation at the genetic level. It intercells, interferes with the translation of NF-kappa B from the cytoplasm to the nucleus and prevents the transcription of pro-inflammatory genes. So it stops the ability to make those, okay? The downstream effect is a reduction in cytokines like tumor necrosis factor alpha and IL-6. And these are just what we call cytokines that cause problems in the body. The same cytokines that also drive chronic eczema, rosacea, psoriasis, mast cell activation, and many of the chronic inflammatory skin conditions that midlife women experience. And you don't even have to be midlife to experience these. Critically, KPV also stabilizes mast cells. This is super important. The immune cells that release histamine and other inflammatory mediators in response to triggers. For patients with mast cell activation syndrome, with chronic urticaria and histamine intolerance, and also with eczema that is partly mast cell-driven, this is one of the most powerful peptides, and it doesn't get used often enough. Even me sitting right here right now, I can probably think of six patients I should be using this in.

[20:23] Like, this is a great peptide and sometimes we forget about it. We think of KPV a lot in our practice for the gut, but I forget that you can also have it in an injection. So definitely these two together. Okay. So imagine your skin's inflammatory system as a smoke alarm that has been going off intermittently for like 15 years. Okay. Sometimes the alarm fires for a real fire, a true, I would say, allergen, actual injury. But by midlife, in many patients, the alarm has been firing for so long, it has become hypersensitive. It now fires at burnt toast. That actually happened to me, but not burnt toast. Another story for another time. Okay. Humidity at a glass of wine, at nothing in particular. So before, like, so when you have an alarm, it should go off for a significant reason. But by midlife, in so many patients, this alarm has been firing for so long that it becomes hypersensitive. So it goes off on everything.

[21:17] It goes off on burnt toast. If it's humid, if there's a glass of wine, then you drink that—nothing in particular. So what I'm saying is that your reaction is much greater in all those circumstances. Okay. The body, hearing the alarm, deploys inflammatory responses that are no longer needed. Okay. KPV does not put out fires. It tells the alarm system that the fire is already over. It quiets the false alarms while leaving the real ones intact, okay? Because you do want to have an inflammatory response when necessary. This is why it works so well in chronic low-grade inflammatory conditions where the immune system has gotten stuck in that kind of wrong setting where it just goes off on everything, okay? Here's the gut connection.

[22:00] KBV is also one of the most powerful, useful gut peptides. Beyond its skin applications, it has been studied extensively in inflammatory bowel disease models. In animal models of colitis, KBV reduces nuclear NF-kappa-B levels of intestinal tissue. It decreases inflammatory cytokine expression and supports mucosal recovery. So, bottom line, it works great in the gut, especially if you have colitis. For patients with ulcerative colitis, Crohn's disease, post-COVID inflammation, and small intestinal bacterial overgrowth, KPV is part of the standard functional medicine gut-healing toolkit that we use. So we have used it a lot, usually with BPC-157. So it matters more than it sounds because so many midlife skin conditions honestly come from the gut. They're a gut driver. Eczema, rosacea both have well-documented gut-skin access components. The patients whose eczema is being driven by intestinal permeability and dysregulated immune activity will benefit from KPV, not just because of its direct skin effects, but because of its gut effects. And the two work very well together. Treating the gut helps the skin. Treating the skin without addressing the gut produces only partial results. So that's important to hear. So if you're dealing with chronic skin issues, you

should be looking at the gut too. Okay. Here's why these two peptides are so often used together and why I'm covering them in the same episode rather than separately. GHK-CU builds. It stimulates collagen synthesis, accelerates wound healing, and supports hair follicle health. It resets gene expression toward a younger-looking you or a younger profile. But it does that work most effectively in tissue that is not actively inflamed. This is so important because, like when I have patients come in and they want their knee injected and they want a peptide or an exosome or something to stem cell in their knee, I always say, you know, the dirt or fertilizer in which you put seeds in matters. Just like if we're putting stuff in the body, if you have a lot of inflammation, we're putting seeds in bad soil. So we have to treat the inflammation. It's so important, okay?

[24:01] If the skin is in a chronic inflammatory flare, the building signals are overwhelmed by the breakdown signals.

[24:31] So picture repair as a two-handed job. One hand calms, the other hand builds. You cannot construct on a fire. Like you can't build something on top of a fire, right? You have to extinguish the flames before the work crew can return. But if all you do is extinguish, you are left with a wet, blackened piece of sweat, right? Better than a fire, but still not whole. So you put the fire out; that's great, but there's still nothing there that you can use. You need both hands. KPV is the hand that calms.

[25:01] GHK-CU is the hand that builds. In midlife skin and hair, both hands are needed at the same time. Because midlife tissue is almost always carrying some type of chronic inflammation and a signaling decline. So there's a reason it's happening. So if you use them together and they work, the work actually proceeds in the right order. So you get rid of the inflammation, and then you can build something. All right. Okay, let me walk you through the specific changes patients experience because what these peptides do, like all the peptides I've talked about, is pretty remarkable and meaningful.

[25:35] So it affects skin tone, texture, and brightness. This is usually the first visible change patients describe. Typically, about four to eight weeks of starting topical or systemic GHK-CU, the dullness Kathleen saw in her wedding photos begins to lift. Skin tone evens out. Surface texture smooths. Patients describe skin feeling alive again, like that turnover. There was actually a 2022 pilot study found modest improvements in skin brightening measurements after eight weeks of topical application. The change is noticeable in photographs taken at consistent lighting before and after.



[26:11] I have found in my practice that, actually, injection produces even better results than topical application. Fine lines and skin thickness. Collagen synthesis stimulation is one of the most well-documented effects of GHK-CU. In studies of aged human skin, GHK-CU treatment increases collagen production, improves elastin organization, and modestly increases skin thickness. Fine lines around the eyes and the mouth begin to soften over 8 to 16 weeks. So it takes a little bit longer. Deeper wrinkles change less, but the surrounding skin quality improves enough that the wrinkles look less prominent. This is not the dramatic change of an injectable filler. So I want to make sure you're aware of that. It's the slower, deeper change of restored tissue architecture. And that's also why we like this with Neogen because Neogen does that too.

[26:56] It changes the architecture of the tissue. You produce healthy new skin cells. So if someone wants to walk in, get a filler, and walk out, they're going to have changes immediately. But we love Neogen and these peptides because they change it over time. So if you're looking for something where you look like you, yourself, without any strange-looking stuff in your face, you're going to look even better, and you're going to look healthier, but you're going to look like you're younger yourself. You're not going to look different if you don't need it. Okay. What else does it do? Wound healing and post-procedure recovery. So here's where GHK-CU has some of its strongest clinical evidence. In a 2024, so that's pretty recent, multi-center study investigated 0.05% GHK-CU gel after fractional laser resurfacing.

[27:41] The peptide group exhibited 25% faster epithelial recovery and reduced erythema within 72 hours. For patients undergoing micro-needling, laser treatments, chemical peels, or other procedural skin renewal, GHK-CU accelerates the recovery phase and improves the final cosmetic outcome. This is not a marketing claim. This is consistent across multiple clinical studies. Okay, so it's pretty impressive—hair restoration. Copper peptide is one of the most evidence-backed peptide applications for hair loss. Multiple studies have shown GHK-CU performs at least as well as minoxidil 5% for stimulating hair growth, though it's a different and more targeted mechanism than minoxidil.

[28:21] It's supporting follicle health, improving scalp circulation, and reducing inflammatory signaling at the follicle level. A 2025 Japanese trial using 0.02% peptide lotion observed a 7% increase in hair count after weeks. So 7%, you know, I say it's not much, but you're looking at your whole head of hair; it's definitely an increase. The change is modest in any single patient, but compounded with growth hormone secretagogues, hormonal optimization, and the rest of a comprehensive mid-life

protocol, the results can be visible by month four and six. So what does that mean? So you're addressing hormonal optimization because you need estrogen/progesterone for hair growth, even need testosterone, not too much, not too little. If you're low in growth hormone, if you are taking a CJC IPA, you're going to increase your growth hormone secretagogues. That's going to help with hair growth.

[29:10] And then also to looking for inflammation and treating that. So if you add all those things together, patients describe their part narrowing, their ponytail thickening, and the texture of the hair improving. And I can attest to this. Like I can tell the texture of my hair is already better. I can tell that my hair is thicker. And when I look at my wedding picture and look at my hair 10 years later, I could tell, not a favorable difference. And that's why I started some of these peptides in treatments because I was like, oh, my hair is not this thick. This is KPV's domain. For patients, so I would say eczema, rosacea, and chronic inflammatory skin conditions, this is KPV's domain. For patients like Kathleen with chronic eczema, this has been managed with topical steroids for years. KPV addresses the underlying inflammatory dysregulation that steroids were only suppressing. KPV combined with GHK-CU can produce meaningful improvements in eczema, rosacea, periorbital dermatitis, and chronic urticaria. Importantly, KPV works without the side effects of long-term steroid use. No skin thinning, no rebound flares, just thought of a patient, a rebound flare, and no compromise of the skin barrier. Okay, picture your skin in midlife as a garden in two seasons at once. The growth signals of summer- collagen synthesis, follicle activity, repair- they're all fading. The breakdown signals of autumn, okay inflammation oxidative damage matrix and degradation those are accelerating okay so let's do that again the growth signals collagen synthesis follicle activity repair and repair are starting to fade when summer's leaving and then the breakdown signals of autumn inflammation oxidative stress or damage and matrix degradation are starting to come up they're accelerating the garden has plenty of bare patches the leaves are beginning to fall but GHK-CU and KPV together nudge the system back towards summer. They do not stop autumn forever. That's impossible.

[31:05] You can't stop it from coming. You can't stop aging. But they are extended. They basically extended the growing season by several years. And they help the garden behave like a lush version of itself. It has not seen probably in decades. The garden was not gone. It was just waiting for the right weather to return. And that's how you want to think about it in the body. Okay. Mast cell activation is, so this is where the peptides are being used. So I've done one, two, three, four, five. This is the sixth thing: mast cell activation and histamine issues. So KPV stabilizes mast cells. For patients with mast cell



activation syndrome, chronic histamine intolerance, idiopathic urticaria, and just all the symptoms combined that arise when mast cells are firing inappropriately, KPV is one of the most useful peptides in our toolkit. It is often combined with BPC-157 for patients whose MCAS as we call it, has a gut driver. And with low-dose naltrexone or other foundational therapies, this can work very effectively. For patients who have spent years on antihistamines without resolution, KPV could be the addition that finally addresses the upstream problem of signaling rather than just blocking the downstream symptoms because that's what the antihistamines do. And then the other indication is post-inflammatory hyperpigmentation and scarring.

[32:18] So GHK-CU modulates matrix metalloproteinase activity in a way that supports balanced tissue remodeling. So for patients with post-inflammatory hyperpigmentation, which I mentioned earlier, mild scarring or stretch marks, and other forms of disordered skin remodeling, GHK-CU can produce gradual improvements over three to six months. The effect is not as dramatic as clinical procedure like laser, but the molecular substrate of better remodeling is laid down by the peptide. So it's treating it from the inside out. So imagine the younger version of your skin and your hair as a statue that's been buried, I would say, under decades of dust, okay? The statue's not gone. The marble is intact. The artistry is preserved. What has changed is that you have stopped seeing it because a layer after layer of inflammation, oxidative damage, and signaling decline has accumulated on the surface. That's the dust, okay? GHK-CU and KPV are the cloth that wipes away the dust. The cloth does not carve a new statue. It reveals what was there the entire time. Some patients are generally surprised by how much of the younger skin and hair was waiting to be uncovered when you start using this protocol. Others discover that the cloth has limits. Some damage has accumulated below the surface and requires more than just signaling for restoration. And that honestly does matter, but for many patients, the dust is the problem. Wipe it away, the statue is still there. So I would say the majority, probably 80% of patients, do get really great results. Okay? But there are some who just, it's just too much and they're not going to get as good a result. Like it's going to take more than just this. Okay.

[34:49] And as a subcutaneous or intradermal injection in clinical settings for systemic effects or targeted local effects. For most midlife patients, the protocol I use combines a daily topical GHK-CU serum with a periodic in-office post-procedure application, or usually as a post-procedure application. I'll use that mostly. For patients who want deeper results or have systemic concerns- hair loss across multiple areas, generalized skin laxity, slow wound healing as a body, and this is where I would add a subcutaneous

injection. That makes sense. Delivery methods for KPV. That was just GHK-CU. KPV is most commonly delivered in three ways.

[35:27] Orally as a capsule; we use it all the time with BPC-157, primarily for gastrointestinal application. As a topical cream or ointment for skin-targeted indications, like eczema we were talking about, and as a subcutaneous injection for systemic anti-inflammatory and mast cell stabilization effects. For the patient with eczema and gut symptoms, oral plus topical is often the right combination. For the patient with primarily skin-localized inflammation, topical alone can suffice. Dosing, as always, I don't give specific dosing because every patient is different, but an order of magnitude for topical GHK-CU is 0.02% to 0.1% concentration range for cosmetic use and higher for prescription compounded formulas. Subcutaneous GKCU is dosed in milligram ranges, and KPV oral is typically dosed in 200 to 500 microgram ranges. And that's two or three times daily.

[36:21] And I would say for our patients, probably twice daily. Topical KPV concentrations vary, obviously, based on formula. So duration and cycling. Topical GKCU can be used continuously. There's no benefit to cycling on and off like the other peptides we talked about. And the cosmetic evidence supports daily use indefinitely. Injectable GHK-CU is typically cycled, though, 8 to 12 weeks on and then 4 weeks off. And that's to avoid receptor down-regulation. KPV oral is typically used for an 8 to 12-week course, then reassessed. So it's not so much about cycling in the oral, but injection is cycling 8 to 12 weeks, 4 weeks off, and receptor down-regulation is what you're trying to avoid. And then KPV oral is typically 8 to 12 weeks.

[37:07] And then reassess. Some patients benefit from continuous low-dose maintenance. Others, it's only during inflammatory flares, and then they can come off of it. Okay. What should you expect? Topical GHK-CU produces visible changes over weeks to months. Skin brightness and texture often shift first by weeks 4 to 8. Fine lines and skin quality improve weeks 8 to 16. Hair changes take a little bit longer. Most patients need 16 to 24 weeks to see meaningful hair density changes.

[37:36] And I honestly tell my patients who are anything for the hair, you have to give it six months. Like you really do have to give it six months, 24 weeks. With the most, I would say, pronounced effects usually at six months and beyond. So for my patients, I usually say, give at least six months to know if it's working. And if you see it's working, give another six months to do its job. So, I usually say plan to be on it for a year, okay? Wound healing acceleration is essentially immediate. Within days of starting topical application, most post-procedural recovery is a lot faster. KPV effects on inflammation

are typically faster as well. Most patients with eczema or mast cell symptoms describe meaningful improvement within one to four weeks of starting KPV.

[38:15] Gut symptoms typically respond within two to six weeks. As always, foundations first. So these peptides work when foundations are in place. Adequate protein, because skin and hair are built on protein. Adequate vitamin C, adequate copper and zinc. And biotin only if you're deficient, because a lot of times patients take biotin, but they're not always deficient. So you want to make sure you're deficient. And I want to just say that you do have to have sufficient levels of vitamin C, copper, zinc, and biotin for collagen and keratin synthesis.

[38:46] And hair is keratin, okay? Some protection, because UV damage continues to drive matrix degradation. So regardless of how much GHK-CU you're applying, if you're not staying out of the sun and protecting your skin, you're just wasting your money. Okay. Adequate sleep, because skin remodeling, just like recovery, happens overnight. And I don't know any of you who wouldn't say that if you don't get a good night's sleep, it shows in your face, right? Hormonal optimization in perimenopause patients because declining estrogen drives much of the cascade these peptides are addressing. So if you're trying to address the cascade and you're not giving it estrogen as a scaffolding, which is so important, you're not going to get the best result. And then gut healing for patients with inflammatory skin conditions, especially those with inflammatory conditions like eczema, rosacea, because the gut has to be healed.

[39:35] So that's your inflammation, right? GHK-CU and KPV pair beautifully with the rest of the other peptides that we've talked about in this series. So BPC-157, I just already told you we use that BPC-157 and KPV together all the time. TB-500, which is a reparative peptide we just talked about in our last episode. You get systemic tissue repair plus targeted skin and hair effects. CJC-ipemoralin - growth hormone signaling, supports the same collagen synthesis pathways that GHK-CU is amplifying. So they're amplifying the pathway. Larazotide for patients with inflammatory conditions that have a gut driver because they have what we call leaky gut or permeable gut.

[40:13] And their tight junctions and aren't working. And then bioidentical hormone therapy in perimenopausal women or menopausal women because hormone optimization addresses the upstream driver and much of the visible aging cascade. So aging happens when we lose our hormones, 100%. Okay. Who should not use them? GHK-CU and KPV both have remarkably clean safety profiles, but contraindications, they do exist, and they do matter. So GHK-CU should not be used in patients with active skin infections at the application site. Known copper metabolism disorders.

[40:45] There is a disorder called Wilson's disease. So you do not want to use a copper peptide in that patient. Or severe allergic reactions to copper compounds. And I actually have some patients who have copper allergies. Pregnancy and breastfeeding: contraindications for injectable use, for sure. KPV is generally well tolerated with caution in patients with immunosuppressive therapy, but with caution. And by a provider who knows what they're doing. Both peptides should be prescribed by a provider, sourced from a licensed compounding source, and used as a prescription product, as I've said many times.

[41:18] The chain of command matters. Okay. All right. So for Kathleen, what do we do? Sequence matters. I say that every time. First, comprehensive testing. Look at the hormone panel. Her estrogen was low. Her progesterone was very low.

[41:30] Her DHEA is at the bottom of the reference range. Her IGF-1 was at the low end of normal. Vitamin D was about 35. Her ferritin was 38, so low for an active woman with thinning hair because you have to have iron to grow hair, okay? Ferritin below 70, I usually say even 90, is associated with hair loss in many women, so I want my ladies to have ferritin of 90 or above. Her thyroid is within range, but her free T3 was also below optimal. Her high-sensitivity CRP was 2.4, mildly elevated. So we set off also a comprehensive stool analysis. We did a GI map on her because she had eczema, and that confirmed dysbiosis.

[42:10] We're going to talk about that. So foundations: protein, minimum 100 grams per day; vitamin D supplementation aiming for a level of 70 to 80; iron supplementation to bring her ferritin to the optimal range for hair growth. We addressed her dysbiosis with dietary changes for her gut and targeted a gut protocol. We initiated bioidentical progesterone and topical transdermal estradiol to address her hormones as the driver of much of the skin and hair decline. Okay. We removed alcohol entirely for the first 12 weeks. You heard me, entirely for the first 12 weeks.

[42:43] Added a daily SPF of 50, something Kathleen hadn't been consistent about doing for years, so that's really important. We have to protect the skin we're trying to help, okay? The third thing in her targeted protocol started her on topical GHK-CU twice daily, paired with a topical KPV cream applied to her eczema-prone areas. At week four, we added oral KPV for the gut skin access and the mast-cell-driven component. And if I remember correctly, it was BPC plus KPV that we used. At week six, we did a series of three treatments on her. At that time, I was doing a lot more microneedling because we didn't have Neogen. So we did microneedling for her.



[43:25] And we did it at four-week intervals. And I did use actually, injectable GHK-CU, okay, because she had maximal absorption with the little holes that we put in with the microneedling, okay? At week 12, because her hair was thin, we added subcutaneous GHK-CU injections twice weekly to see if we could help with the hair.

[43:55] Six months in, her skin tone was noticeably brighter. Side-by-side photographs showed that, and we took her in the same lighting. Her fine lines around her eyes had softened. Her eczema flares she'd been having for six to eight weeks, every six to eight weeks, did not recur, or she hadn't had anything for four months, at the time that I jotted my notes down. She had been off topical steroid creams entirely for two months. Her ponytail circumference was getting larger. The part in her crown had narrowed visibly because you know you can really tell when your part starts to open. You can see your scalp. Her ferritin is now 92, and she told me at her last visit that, as a matter of fact, in kind of like I would say a matter of fact tone, she looked at a picture of herself recently and the picture from her daughter's body, and she herself could tell a huge noticeable difference and had a big smile on her face. So that was actually nice to see. Okay. So with the right protocol, right patient, right peptides, and all the foundations in place, you can really get great results without having to have a facelift or transplant or anything else, or fillers into your face.

[44:51] And I'm not against fillers or Botox or those things, but some people just want a more natural approach to aging. And I think this gives that to you. Things that you could do that don't have anything with peptides to help your skin and the aging of your skin are, one, get your ferritin level tested. For women in midlife, hair thinning, ferritin below- I'd say 90 is one of the most common and most missed contributors to hair loss. And we check it in every wellness panel. Every patient gets a ferritin. Okay. So I would say the reference range on ferritin starts pretty low, 12, but optimal hair growth requires at least 90, okay? And your CBC won't flag it. And your iron panel won't flag it. You have to get a ferritin level, okay? Wear SPF every single day, including indoors, near windows, screens. UV damage is the largest single accelerator of the same matrix degradation cascade that GHK-CU is trying to reverse. So yes, you can be out in the sun, but wear your sunscreen. No peptide on earth can outrun ongoing daily UV damage. So remember that.

[45:56] And I try to put mine on every day, twice a day, sometimes. Add 100 to 200 milligrams of vitamin C and adequate dietary copper to your daily routine. I say that with caution. Vitamin C, you pretty much can't hurt yourself. Be careful about copper. Just get your levels checked to make sure you need some and know what your levels

are. Copper from food sources, though, organ meats, shellfish, nuts, seeds, dark chocolate supports the same collagen synthesis pathway that GHK-CU activates. Vitamin C is an essential cofactor, and you can't really hurt yourself with vitamin C. The most you may be giving yourself is diarrhea, okay? If you have chronic eczema or rosacea and have been managed with topical steroids for years, you should be asking me or your functional medicine provider about KPV. Steroids suppress. KPV addresses upstream inflammatory signaling. Long-term steroid use does carry real costs. And I just saw recently someone who had steroid withdrawal and had a worsening of symptoms like urticaria and rash and everything. So it's not pretty. If you're considering microneedling, laser resurfacing, chemical peels, or any type of invasive procedure, topical GHK-CU application and neat post-procedure can be really helpful.

[47:48] These peptides are in our body, and we were making them long before we were young and healthy. So they just, it's like that light bulb analogy I always give. Like the light is fading, and all you have to do is send some electricity to that outlet, to that light, and it brightens, right? And makes everything better. And that's the same thing that happens when we start to reawaken your skin cells, okay? Because peptide, GHK-CU, is quietly faded by 60%, right? So that's huge between your 20s and your 60s. So no skincare product on the market can fully restore the signal from the outside.

[48:21] You have to really work from the inside out, okay? The companion KPV calms inflammatory backgrounds. Always think, do I have inflammation? Got to treat that and that because that will prevent repair and growth, okay? Together, they restore the conversation your body can make in order to get GHK-CU to do what it's supposed to do. So one thing I do want to say, these peptides won't give you the skin and hair of a 22-year-old. So be reasonable. No peptide will. But what they will do is use carefully, source responsibly, paired with the right foundations, they actually can restore some very meaningful percentage of tissue capacity your body used to have like 20 years ago.

[49:03] So if you're 60, that's 40. If you're 45, I don't know if it's 25, it might be more like 30, right? So it's going to be different. Restoration will be different between people, but feeling like a woman who's not recognized herself in a picture is much different than feeling like a woman who's proud of how she's aging, right? Okay, so our next episode, we're going to talk about NOT-C. So M-O-T, little s, hyphen C. It's a mitochondrial peptide that targets cellular energy production at its source, the mitochondria.

[49:33] With your gut sealed, that was in the beginning, your tissue repaired, your immune system, I would say, rebuilt, your master signaling restored, your visceral fat



reduced, your connective tissue remodeled, and your visible self returned. So that's all the different peptides we've talked about and what they accomplished. Then the next layer and the deepest one yet is the energy your cells produce moment by moment. And this is what I really love to talk about, MOTS-c. So that's going to be our next episode. If today's episode resonated with you, share it with a friend, especially someone who's struggling and feels like they're aging because women, we need to help each other. There's no reason to keep it to yourself. I try to share all my tips and tricks because we all need them and more women who feel competent, beautiful, energetic, just makes the world that much better.

[50:22] Okay. Thanks for listening. I'm Dr. Tracy Page and this is Midlife Clarity and I believe when you have clarity, everything changes. Usually for the good. Talk to you soon.