Your Sweat Speaks. We Listen.

THE SWEATINEER GUIDE 101

YOUR SWEAT SPEAKS. WE LISTEN.

Prepared by Alfredo E. Ongaro

Onalabs Inno-Hub
onalabs.com
July 16, 2026

Chapter 1. It Is Not Diluted Blood

A salty clue that saved lives

In a small village in medieval Europe, a midwife leaned over a newborn, touched her tongue to its forehead, and whispered:

"Woe to the child who tastes of salt when kissed on the forehead, for he is cursed and will soon die."

She had no microscope and no laboratory, but she had a thousand-year tradition of observing, listening, and tasting. And she was right. Those salty babies almost always died young, their lungs slowly suffocated by thick, sticky mucus.

The mystery waited centuries. In 1938, a physician gave the disease a name: cystic fibrosis. The breakthrough, however, came during a brutal heat wave in New York in 1948. Pediatrician Paul di Sant' Agnese watched his emergency room fill with dehydrated children and noticed something strange: children with cystic fibrosis were losing too much salt through their skin. Their small hands left white, crystalline prints on the rims of water glasses [1].

By 1953 he had proved it: these children's sweat carried drastically elevated levels of sodium and chloride [1]. That observation gave doctors a simple diagnostic test — collect the sweat, measure the chloride, know the disease — and it remains the gold standard today [2].

But chloride is only one of dozens of secret travelers in your sweat.

But wait, why do we have sweat glands at all?

So that we don't die of overheating.

Your body is a furnace that never shuts off. Even at rest, your organs generate heat. Start running and your muscles produce 15 to 20 times more [3]. Without a way to shed it, your core temperature would reach dangerous levels within minutes.

We have between two and four million sweat glands, roughly twice the population of Barcelona [21]. Most are eccrine glands: tiny coiled tubes buried 2 to 3 millimeters below the surface. When sweat evaporates from the skin, it carries the heat away with it — the same reason you feel cold stepping out of a swimming pool. It is the most efficient cooling system in the animal kingdom [3].

And here is the evolutionary twist: this cooling system may be the reason you exist.

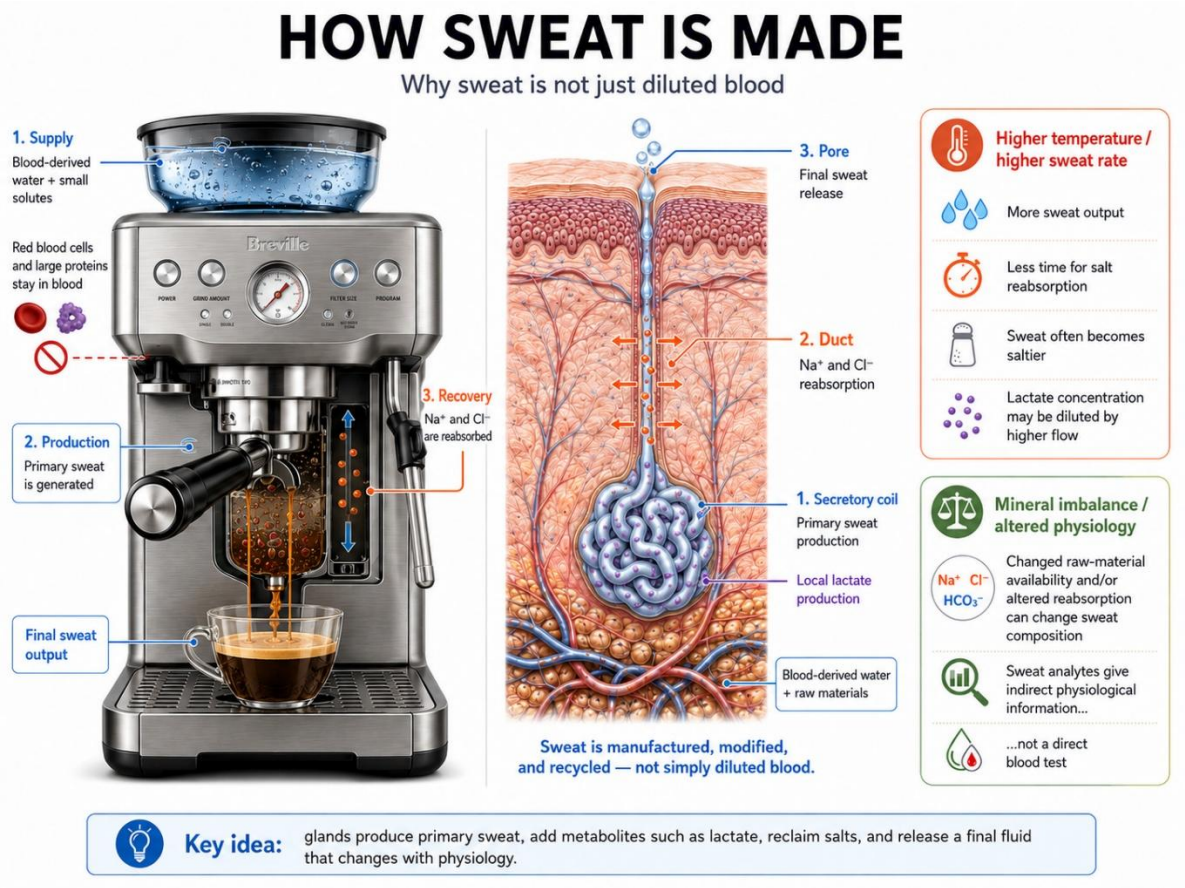
About two million years ago, our ancestors on the African savanna were slower than any animal they wanted to hunt. A kudu sprints at 70 km/h; an early human, maybe

15. But most four-legged animals cool themselves by panting, and they cannot pant while galloping: their breathing is coupled to their stride [29]. After a sprint, they have to stop, flanks heaving.

Humans have no such limitation. We sweat while we run. Our cooling is completely independent of our breathing [29].

So our ancestors invented persistence hunting: chasing an antelope at a steady jog under the midday sun. You never catch it in a sprint. But every time it stops to pant, you keep coming. After an hour or two, the animal collapses from heat exhaustion [28].

We traded our fur for millions of sweat glands. And it worked.



Not diluted blood: the coffee machine

Many people assume that sweat is simply a watery version of blood that seeps passively through the skin. It is not [3, 23]. To understand what actually happens, picture a coffee machine.

- The water reservoir is your blood.

- The coffee machine is your sweat gland.
- The coffee that comes out is your sweat.

A coffee machine does not pour tap water into your cup. It takes water from the reservoir, filters it, and adds its own ingredients. What comes out is completely different from what went in.

Your sweat gland does exactly the same thing:

First, it draws from your blood. A coiled section at the base of the gland sits beside tiny blood vessels and pulls water and dissolved substances out of the blood, creating a raw, plasma-like fluid [3]. That is the machine simply taking water from the reservoir.

Next, the duct modifies it. As this fluid rises toward the skin's surface, the duct walls actively reabsorb sodium and chloride and return them to the body [3]. That is a filter inside the machine recovering most of the salt before the liquid comes out.

Finally, the gland adds its own ingredients. It manufactures lactate, ammonia, and antimicrobial proteins in quantities far greater than what arrives from the blood [13, 3]. These are the “ground coffee”: flavors the machine itself adds, not mere traces carried over from the reservoir.

What comes out is not blood. It is a fluid with a chemical fingerprint all its own.

And, like a coffee machine, the result changes with the conditions. When it is hotter or you exercise harder, the glands work faster, more water flows, the filters have less time to reabsorb salt, and sweat turns saltier [3, 4]. When you are well hydrated, the reservoir is full and the machine runs smoothly. When you are dehydrated, the flow slows and the chemistry shifts.

Sweat is roughly 99% water. The remaining 1% is where things get fascinating.

Chapter 2. What Comes From Your Blood: the “Reservoir Water”

Salt and minerals

Sodium and chloride are why sweat tastes salty, but the amount varies enormously. In marathon runners, sweat sodium ranged from 7 to 96 millimoles per liter [4]. Some finish with white salt stains on their shirt; others with nothing visible. They are not sweating more water, they are sweating saltier water. Why? Genetics, fitness, diet, heat acclimatization, and sweat rate all shift the balance [3]. Potassium, calcium,

magnesium, and bicarbonate also travel in sweat, straight from the blood; they are minerals already sitting in the water reservoir.

A curious detail: your sweat changes acidity with effort. At low sweat rates, the duct reabsorbs bicarbonate and the remaining sweat turns acidic, with a pH as low as 4. At high sweat rates, less bicarbonate is reabsorbed and the pH rises toward neutral [3]. You sweat less acid when you push harder.

Glucose

Blood glucose sits between 4 and 7 mmol/L. Sweat contains it too, but about a hundred times lower [3, 6]. That tiny amount has fueled a big dream: monitoring diabetes without needles. In 2025, researchers published a wireless sweat patch in PNAS that tracked glucose during exercise [5]. But the relationship between sweat glucose and blood glucose varies from person to person, there is a time lag, and skin contamination interferes [6, 23]. We are not replacing finger pricks yet, but the field is moving fast.

Cortisol

When you are stressed — a deadline, a bad night, a hard workout — your adrenal glands release cortisol into the blood. Some of it ends up in sweat, like a flavor added to the water before it reaches the machine [7]. A blood or saliva test offers a single snapshot. A wearable sweat sensor could track cortisol continuously, across a workday, a night of sleep, or a military deployment. Researchers have already built prototypes that monitor cortisol alongside inflammatory signals such as IL-6 and TNF-alpha simultaneously [7].

Estradiol

Estradiol is the most potent form of estrogen, the hormone that orchestrates the menstrual cycle, supports bone density, and protects the cardiovascular system. Like cortisol, it circulates in the blood and partitions into sweat, but at a concentration roughly 50 times lower [8]. It is like trying to hear a radio playing quietly in a noisy café. In 2023, Wei Gao's team at Caltech built a coin-sized wearable patch using aptamers, short strands of synthetic DNA that trap estradiol molecules like molecular tweezers. When an aptamer captures estradiol, it triggers an electrochemical signal picked up by gold nanoparticles. The result: a wireless, real-time reading from a few drops of sweat on the wrist [8].

Why does it matter? For anyone trying to conceive, estradiol signals when an egg is maturing, and tracking it currently requires repeated blood draws. A sweat patch could replace that with continuous monitoring at home. It is equally relevant for

hormone replacement therapy and for screening: high estradiol is associated with breast and ovarian cancer risk, and low levels with osteoporosis [8].

Heavy metals

Your sweat contains minute amounts of arsenic, cadmium, lead, and mercury, metals that accumulate through environmental exposure. They are impurities from the water reservoir that end up in the coffee. A 2012 systematic review found that, for some metals, the amount eliminated through sweat was comparable to or greater than urinary excretion [9]. A 2022 study added a nuance: exercise produced significantly higher concentrations of nickel, lead, copper, and arsenic in sweat than sitting passively in a sauna [10]. This is not an endorsement of "detox saunas." The research is still thin and there are no therapeutic protocols. But sweating does appear to be a real, measurable excretion route for some heavy metals [9, 10].

Drugs and alcohol

About 1% of the alcohol you drink is secreted through the skin as invisible sweat vapor. That is enough for the SCRAM bracelet to detect it — a court-ordered ankle monitor used in drink-driving cases that samples skin vapor every 30 minutes [11]. Unlike breathalyzers, it does not care whether you have used mouthwash. Sweat ethanol reaches near-complete equilibrium with blood ethanol, at a ratio of almost 1:1 [11]. The PharmChek sweat patch, worn for 7 to 14 days, detects cocaine, opioids, amphetamines, and marijuana metabolites. It is tamper-evident and closes the gaps left by periodic urine testing. Both technologies are used routinely in the United States judicial system [11].

Cytokines

At the frontier of sweat research, scientists have detected cytokines — tiny signaling molecules the immune system uses to communicate. IL-6, TNF-alpha, and IL-10 all appear at picomolar concentrations [12, 7]. What if you could track chronic inflammation through your skin? Aging, autoimmune diseases, and metabolic disorders all involve altered cytokine patterns. If sweat reliably mirrored those patterns, the implications for long-term monitoring would be enormous [24].

Chapter 3. What the Gland Makes on Its Own: the "Ground Coffee"

Not everything in sweat comes from the blood. The sweat gland is not just a pipe; it is a metabolically active organ that manufactures several substances on site.

This distinction is crucial. If a substance simply leaked out of the blood, its level in sweat tells you about your blood. If the gland produces it locally, the concentration tells you about the activity of the gland — an entirely different piece of information. Confusing the two is one of the biggest traps in sweat research [23].

Lactate

Lactate is one of the most studied molecules in sweat, especially in sports science. A rise in lactate signals the shift from aerobic to anaerobic energy production.

But most of the lactate in sweat does not come from your muscles or your blood. The sweat gland itself produces it [13].

Why? Producing sweat is hard work. The secretory coil needs energy to pump ions and water out of the blood. That energy comes from burning glucose, drawn from the blood, through glycolysis. Lactate is the waste product of that combustion [13].

The proof: researchers injected subjects with radioactively labeled glucose and lactate. The lactate that appeared in sweat was formed from blood glucose, not from blood lactate [13]. The numbers confirm it: resting blood lactate is 0.5 to 2 mmol/L; sweat lactate is 5 to 40 mmol/L, up to 20 times higher [3]. That gap is far too large to be explained by passive filtration.

Wearable sensors that track sweat lactate during exercise can detect the anaerobic threshold [14, 15], but they are seeing a mixture of two signals: the gland's metabolism plus blood lactate diffusing through it. Untangling those two contributions is the challenge. Onalabs took it on and developed its own algorithm to decode it.

Ammonia

Ammonia is present in sweat at concentrations 20 to 50 times higher than in blood plasma — again, far too high to be explained by simple diffusion [3].

The gland produces it by breaking down glutamine, an abundant amino acid, using an enzyme called glutaminase. An interesting pattern: ammonia concentration falls as sweat rate rises [3]. The gland keeps producing ammonia at a more or less constant rate, but faster sweating dilutes it.

Urea

Urea, the molecule your kidneys are most famous for excreting, also appears in sweat at concentrations consistently higher than in blood serum [3]. Like ammonia, it is one of the body's ways of shedding excess nitrogen from protein breakdown.

Dermcidin

This may be the most extraordinary thing your sweat glands do.

In 2001, a team led by Birgit Schittek discovered a small protein they named dermcidin. It is manufactured directly inside the eccrine sweat gland — it does not leak from the blood — and it is secreted onto the skin every time you perspire [16].

Think of dermcidin as a cleaning agent the coffee machine produces itself. Every time the machine runs, it adds this agent to the output.

How does it work? Dermcidin punches tiny holes in bacterial cell membranes, collapsing the electrical charge bacteria need to survive. It acts against E. coli, Staphylococcus aureus, and the yeast Candida albicans, and it stays active across the wide range of acidity and salt levels found on human skin [16].

Evolution gave the sweat gland a second job: coating the skin with a broad-spectrum antibiotic every time the gland switches on. Dermcidin builds a constitutive barrier — always present, always active — that forms the first line of your innate immune defense, before your white blood cells even get involved [16, 17].

And it is not only dermcidin. Sweat also contains cathelicidin, lactoferrin (a protein that starves bacteria of iron [19]), and several other defense molecules. Together, they regulate your skin's microbiome.

The clinical proof: patients with atopic dermatitis have significantly reduced dermcidin in their sweat, which correlates directly with their greater susceptibility to skin infections [17]. Their sweat is, literally, less protective.

A proteomic study found that just five proteins — dermcidin, apolipoprotein D, clusterin, prolactin-inducible protein, and serum albumin — make up 91% of all the proteins in sweat [18].

Amino acids

Sweat contains free amino acids (serine, histidine, alanine, and ornithine) at relatively high levels compared with blood. Many come from a structural protein called filaggrin, located in the outermost layer of the skin [20]. Think of tiny fragments of the coffee cup itself ending up in the coffee as it passes. As skin cells die, filaggrin breaks down into “natural moisturizing factors,” and sweat picks up these fragments.

Male athletes exercising in heat of 32 to 34 degrees C can lose enough amino acids through sweat that some researchers wonder whether heavy sweaters should account for these nitrogen losses in their nutrition plans [20].

Chapter 4. So What Is Sweat, Really?

Sweat is not blood filtered through a membrane. It is a selectively processed fluid produced by an organ that:

Draws from blood plasma (water, electrolytes, glucose, cortisol, drugs, metals, cytokines), like water from the reservoir [3].

Recycles part of what it takes (returning sodium and chloride to the body), like the machine's internal filter [3].

Manufactures its own products on site (lactate, ammonia, urea, dermcidin, cathelicidin, lactoferrin) — the ground coffee the machine itself adds [13, 16].

Picks up stowaways from the skin surface (amino acids from filaggrin, sebum, bacterial fragments) — fragments of the cup [20].

The result is a fluid with a chemical fingerprint clearly distinct from that of blood, one that reflects not only what circulates in your veins but also what the gland itself is doing and what is happening on your skin [23].

The next time a drop of sweat runs down your forehead, think of it as the output of a tiny coffee machine:

Your stress level is one of the “flavors” added from the reservoir. Your training intensity affects how the machine runs and what it produces. Your hydration status is the water level in the reservoir. Traces of last night's drink are a faint aftertaste from earlier. A natural antibiotic is the machine's own cleaning agent, added every time. Perhaps a few atoms of lead from your city's old pipes are impurities in the water. Metabolic waste is the “coffee grounds” the machine creates as it works.

It is not diluted blood.

It is a letter your body writes on your skin, and only now are we learning to read it.

Chapter 5. Beyond the Usual Biomarkers: Sweat and Cancer

So far we have explored sweat as a mirror of metabolism: glucose, cortisol, lactate, salt. But what if the same biofluid could look deeper still, into the molecular machinery of disease itself? A growing body of research suggests that sweat may carry cancer-relevant signatures, from tumor-derived metabolites to immune signals and even fragments of genetic material. The idea is still young, but the early evidence is compelling.

Cancer cells reprogram their metabolism. They consume glucose voraciously and excrete lactate even in the presence of oxygen, a phenomenon known as the Warburg effect. They release proteins, lipids, and nucleic acids into the bloodstream inside tiny vesicles called exosomes. They drive chronic inflammation, raising cytokine levels. All of these analytes — glucose, lactate, cytokines, exosomes — have already been detected in sweat [3, 13, 24]. The question is no longer whether cancer leaves traces in sweat, but whether we can read them with enough sensitivity and specificity to make clinical decisions.

Recent work has shown that sweat exosomes carry molecular cargo (proteins, microRNA, and lipids) that reflects the alterations present in disease states [30]. A 2025 review published in Molecular Cancer described sweat exosomes as "a new horizon of liquid biopsy in cancer," highlighting their potential for early detection, treatment monitoring, and tracking disease progression without a single blood draw [30]. Meanwhile, hydrogel-based wearable sensors using surface-enhanced Raman spectroscopy combined with artificial intelligence have achieved accuracy above 80% in monitoring lung cancer treatment response through sweat carbonyl biomarkers [31].

Sweat, exercise intensity, and cancer recovery

Exercise is one of the most effective interventions available to cancer patients and survivors. It reduces fatigue, improves cardiorespiratory fitness, and has been shown to improve quality of life in almost every cancer type studied [32]. But prescribing the right intensity is delicate: push too hard and you risk injury or immunosuppression; go too easy and the benefits shrink.

Traditionally, exercise intensity is guided by heart rate zones or subjective scales. But lactate thresholds — the metabolic boundary where the body shifts from aerobic to anaerobic energy production — offer a far more precise, individualized prescription. A study published in Supportive Care in Cancer showed that ventilatory and lactate thresholds are at least as useful as peak VO2 for prescribing exercise intensity in cancer survivors [33].

This is where sweat becomes relevant. Wearable sweat lactate sensors can detect the anaerobic threshold in real time during exercise [6, 7], with no invasive blood samples and no expensive laboratory equipment. For a cancer patient on chemotherapy, recovering from surgery, or managing treatment-related fatigue, a simple skin patch could guide exercise intensity at home: stay below that threshold in a recovery session, cross it in a high-intensity interval. The result is not just better

fitness; it is better recovery, less fatigue, and a measurable improvement in daily quality of life.

The relationship between exercise-induced lactate and tumor biology adds another layer. Recent research shows that exercise-induced lactate behaves differently from tumor-produced lactate. High-intensity exercise actually reverses the intratumoral lactate gradient, inhibiting tumor lactate production and lowering its concentration in the tumor microenvironment [34]. Exercise lactate, far from feeding the tumor, may contribute to the immune and metabolic changes that make exercise oncologically protective.

Sweat as a window into pharmacokinetics

Every drug has a therapeutic window: too little and it does not work, too much and side effects become dangerous. Monitoring drug levels in the body — pharmacokinetics — traditionally demands repeated blood draws, laboratory analysis, and hours of waiting. For patients on narrow-window medications, that means frequent clinic visits and a burden that compounds over years of treatment.

Sweat offers a radically different approach. Because many small-molecule drugs pass from blood into eccrine sweat, their concentration in sweat tracks plasma with a short delay [20, 23]. A wearable sensor on the skin could, in principle, provide continuous pharmacokinetic data without needles.

This is no longer theoretical. In 2026, a team led by researchers at UC San Diego published a landmark study in PNAS describing a wearable patch for continuous levodopa monitoring in sweat [35]. Levodopa is the gold-standard treatment for Parkinson's disease, but its therapeutic window is notoriously narrow and its pharmacokinetics vary enormously between patients and even hour to hour. The patch, worn on the fingertip, uses an osmotic hydrogel to draw sweat passively (no exercise, no electrical stimulation) and a potentiometric biosensor to measure L-dopa concentration in real time.

In clinical trials, the patch showed a strong correlation ($r \approx 0.88$) between levodopa levels in sweat and in blood, and revealed something clinicians had suspected but never quantified continuously: Parkinson's patients metabolize and clear levodopa markedly faster than healthy controls [35]. The vision is a closed-loop system in which the patch feeds data to an automated levodopa pump, holding drug levels inside the therapeutic window around the clock.

The implications reach well beyond Parkinson's. Any drug that shows up in sweat — and many do, from chemotherapeutics to immunosuppressants — is a candidate for continuous, non-invasive monitoring. For cancer patients on oral targeted therapies with narrow therapeutic indices, sweat-based pharmacokinetics could replace the cycle of blood draws and dose adjustments with a simple patch.

Sweat and liquid biopsy in cancer: the search for cell-free DNA

Liquid biopsy has transformed oncology. Instead of operating on a tumor to learn its mutations, clinicians can now analyze the cell-free DNA (cfDNA) and circulating tumor DNA (ctDNA) that tumors release into the bloodstream. These fragments carry the genetic fingerprint of the cancer: its mutations, its methylation patterns, even its fragmentation signature. Blood-based liquid biopsies are already used clinically for treatment selection, minimal residual disease monitoring, and early detection through multi-cancer screening panels.

The question now being asked is whether sweat could serve as an alternative, or complementary, source of liquid biopsy. Exosomes — those tiny vesicles that carry molecular cargo between cells — have been confirmed in sweat [30]. These sweat exosomes contain proteins, lipids, and RNA species that reflect the body's physiological state. If tumor-derived exosomes reach the eccrine gland (and early evidence suggests they do), sweat could carry tumor-specific microRNA and proteins, and potentially even cfDNA fragments.

The technical challenge is sensitivity. Cell-free DNA in blood is already present at minute concentrations, often measured in nanograms per milliliter, and the tumor-derived fraction can be less than 0.1% of total cfDNA. In sweat, concentrations would likely be lower still. But the same was once said of glucose, cortisol, and levodopa in sweat, all of them measurable today with wearable sensors. Advances in electrochemical nanosensors, aptamer-based detection, and CRISPR-based diagnostics are pushing detection limits into the attomolar range.

A sweat-based liquid biopsy for cancer would be transformative. Imagine a patch worn overnight, collecting sweat passively and tracking tumor cfDNA or exosomal microRNA signatures. No needles, no clinic visits, no fasting. Continuous monitoring instead of quarterly snapshots. For early detection, for recurrence surveillance, for treatment response, the information density of a biofluid the body produces naturally and constantly is an extraordinary opportunity.

We are not there yet. But the trajectory is clear: sweat is moving from a biofluid of curiosity to a clinical tool, and cancer may be the field where its non-invasive, continuous, patient-friendly nature matters most.

- Gibson, L. E. & Cooke, R. E. (1959). *A test for concentration of electrolytes in sweat in cystic fibrosis.* Pediatrics, 23(3), 545-549
- Baker, L. B. (2020). *Physiological mechanisms determining eccrine sweat composition.* European Journal of Applied Physiology, 120, 719-752.
- Lara, B. et al. (2016). *Interindividual variability in sweat electrolyte concentration in marathoners.* JISSN, 13, 31.
- Xu, J. et al. (2025). *Wireless sweat sensing with pH-based correlation model for continuous glucose monitoring.* PNAS.
- Katchman, B. A. et al. (2018). *Noninvasive diabetes monitoring through continuous analysis of sweat.* Analytical Chemistry, 90(21), 12834-12842.
- Sekine, Y. et al. (2021). *A novel device for detecting anaerobic threshold using sweat lactate.* Scientific Reports, 11, 4929
- Sekine, Y. et al. (2023). *Anaerobic threshold using sweat lactate sensor under hypoxia.* Scientific Reports, 13, 20498.
- Schittek, B. et al. (2001). *Dermcidin: a novel human antibiotic peptide secreted by sweat glands.* Nature Immunology, 2, 1133-1137
- Rieg, S. et al. (2005). *Deficiency of dermcidin-derived antimicrobial peptides in atopic dermatitis.* Journal of Immunology, 174(12), 8003-8010
- Sears, M. E. et al. (2012). *Arsenic, cadmium, lead, and mercury in sweat: A systematic review.* J. Environ. Public Health, 2012, 184745.
- Porucznik, C. A. et al. (2022). *Excretion of Ni, Pb, Cu, As, and Hg in sweat under two sweating conditions.* IJERPH, 19(7), 4323.
- Jagannath, B. et al. (2020). *Point-of-use sweat biosensor for endocrine-inflammation monitoring.* Future Science OA, 7(1), FSO647
- Sato, K. & Sato, F. (1994). *Glucose metabolism of the isolated eccrine sweat gland.* Journal of Clinical Investigation
- Csosz, E. et al. (2015). *Highly abundant defense proteins in human sweat.* JEADV, 29(10), 2024-2031.
- Park, J. H. et al. (2011). *Lactoferrin exists in the sweat: proteomic analysis.* Experimental Dermatology, 20(4), 369-371
- Lu, Z. et al. (2017). *Eccrine sweat gland development and sweat secretion.* Experimental Dermatology, 25(8), 644-650.
- Song, C. et al. (2016). *Immune-modulating properties of dermcidin.* PMC4684748.
- Vega, K. et al. (2016). *Sweat facilitated amino acid losses in male athletes.* PLOS ONE, 11(12), e0167844.
- Yao, G. et al. (2023). *Gap junction-mediated contraction of myoepithelial cells in eccrine glands.* PMC10657463

- Heikenfeld, J. et al. (2019). *Accessing analytes in biofluids for peripheral biochemical monitoring.* Nature Biotechnology, 37, 407-419.
- Sempionatto, J. R. et al. (2022). *Wearable chemical sensors for biomarker discovery.* Nature Reviews Chemistry, 6, 899-915.
- Gamella, M. et al. (2014). *Non-invasive electrochemical biosensing for alcohol level via sweat.* Analytica Chimica Acta, 806, 1-7.
- Brasier, N. & Eckstein, J. (2019). *Sweat as a source of next-generation digital biomarkers.* Digital Biomarkers, 3(3), 155-165.
- Marques-Deak, A. et al. (2006). *Measurement of cytokines in sweat patches and plasma.* J. Immunological Methods, 315(1-2), 99-109
- Precedence Research (2024). *Wearable Sweat Sensors Market Size Report*
- Lin, S. et al. (2023). *A wearable aptamer nanobiosensor for non-invasive female hormone monitoring.* Nature Nanotechnology, 19(3), 330-337.
- Huang, Z. et al. (2025). Sweat exosomes: A new horizon of liquid biopsy in cancer. Molecular Cancer, PMC11863931.
- Li, X. et al. (2024). Hydrogel based flexible wearable sweat sensor for SERS-AI monitoring treatment effect of lung cancer. Sensors and Actuators B: Chemical.
- Lavin-Perez, A. M. et al. (2021). High-intensity exercise to improve cardiorespiratory fitness in cancer patients and survivors: A systematic review and meta-analysis. Scandinavian Journal of Medicine & Science in Sports, 31(2), 265-294.
- Kuhn, M. et al. (2020). Exercise intensity prescription in cancer survivors: ventilatory and lactate thresholds are useful submaximal alternatives to VO2peak. Supportive Care in Cancer, 28(11), 5521-5528.
- Moreno-Gonzalez, M. et al. (2024). Context matters: divergent roles of exercise-induced and tumor-derived lactate in cancer. Frontiers in Oncology.
- Tu, J. et al. (2026). A wearable patch for continuous levodopa monitoring in sweat: towards exertion and power-free pharmacodynamic assessment in Parkinson's disease. PNAS.