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UCLA Study Highlights Possible Role of Creatine in Cancer Immune Defense

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STORY AT-A-GLANCE

- UCLA researchers found that creatine may do more than support muscle performance; early research suggests it also helps power key immune cells that coordinate the body's defense against cancer
- When immune cells were unable to absorb creatine, they showed lower survival, weaker activation, and a reduced ability to stimulate the T cells responsible for attacking abnormal cells
- Creatine helped immune cells maintain higher levels of ATP, the body's primary cellular energy source, allowing them to stay active and communicate more effectively
- In a mouse melanoma model, creatine supplementation was linked to slower tumor growth, more active immune cells inside tumors, and stronger cancer-fighting immune responses
- Supporting healthy cellular energy through adequate creatine intake, nutrient-dense foods, healthy carbohydrates, and lifestyle habits that strengthen mitochondrial function may help create a stronger foundation for immune health

You may know creatine as a supplement for building muscle and improving workout performance. It's one of the most popular products in sports nutrition, your body produces it on its own, and you take in more of it whenever you eat red meat or seafood. What you likely haven't heard is that this same compound may play a role in how your immune system defends against cancer.

That possibility comes from a study conducted by researchers at the University of California, Los Angeles (UCLA) and published in iScience.[1] Rather than examining creatine's familiar effects on muscle, the researchers asked whether it helps a specialized set of immune cells do their job inside tumors, a setting where immune defenses often falter and treatments lose their effectiveness.

The answer turns out to hinge on something simple — energy — and on a set of immune cells most people have never heard of. To see why that matters, it helps to follow what the researchers observed inside the immune cells themselves.

Researchers Uncovered a New Role for Creatine Inside the Immune System

For the iScience study, researchers investigated whether **creatine** influences the activity of dendritic cells, the immune cells responsible for alerting and directing other immune defenders against cancer.[2] The researchers focused on tumors because these environments often suppress immune function and make it harder for the body to recognize and attack abnormal cells.

Instead of studying creatine's effects on muscles or exercise performance, the study examined whether this well-known energy compound helps immune cells maintain the energy required to function effectively inside tumors.

- **The study showed that immune cells actively increased their demand for creatine** — According to the researchers, dendritic cells inside tumors dramatically increased production of the creatine transporter, a specialized protein that pulls creatine into the cell. When researchers removed this transporter in laboratory mice, the immune cells struggled.

  Survival dropped, activation weakened, and the cells lost much of their ability to communicate with cancer-fighting T cells. This finding highlights an important principle: immune defenses require energy just as muscles do. If immune cells can't access the fuel they need, their ability to coordinate a response declines.

- **Creatine supplementation strengthened several measures of immune performance —** When researchers added creatine to dendritic cells, the cells survived longer and displayed stronger activation markers on their surfaces. These markers act like identification badges that signal the cells are ready for action.

  Creatine-treated cells also produced higher amounts of important inflammatory messenger molecules. While inflammation often receives negative attention, these short-term signals are necessary for a strong immune response against threats. Think of them as emergency alerts that mobilize additional immune resources when danger appears.

- **The biggest improvements appeared in the cells' ability to activate cancer-fighting T cells —** Researchers conducted experiments in which dendritic cells interacted directly with T cells. When creatine transport was absent, T cells multiplied less effectively, showed lower survival, and produced fewer immune-defense chemicals.

  Those T cells also displayed weaker activation markers, suggesting a less effective response. The study found that creatine helped maintain the communication chain between different branches of the immune system. Much like a coach relaying instructions to players on a field, stronger dendritic cells delivered stronger signals that led to more active T cells.

- **Tumor growth slowed when creatine supported the immune environment —** In a mouse melanoma model, animals receiving creatine developed more active dendritic cells within their tumors and experienced reduced tumor growth compared to untreated animals. Researchers also found greater numbers of a highly effective subtype of dendritic cell known as cDC1 cells, which specialize in presenting tumor material to T cells.

  Single-cell genetic analysis showed increased activity in genes linked to immune activation. At the same time, T cells inside tumors displayed stronger pathways associated with activation and cancer-fighting functions. The results suggest that

improving the energy status of one immune cell type created a ripple effect throughout the broader immune response.

- **The mechanism centered on adenosine triphosphate (ATP), the body's cellular energy currency —** The researchers discovered that dendritic cells lacking creatine transport had lower levels of creatine, phosphocreatine, and ATP, along with a reduced ability to maintain energy reserves. ATP functions like rechargeable cellular currency that powers nearly every biological task. Creatine acted as an energy buffer, helping cells store and rapidly regenerate ATP when demand increased.

  Cells receiving creatine maintained higher ATP levels and lower levels of energy-stress markers. This stronger energy balance activated key immune signaling pathways, including the signaling pathway dendritic cells rely on to mature and switch on their immune-defense genes. Creatine helped immune cells keep their batteries charged. With more available energy, those cells stayed active longer, communicated more effectively, and mounted a stronger response against tumors.

  While these findings provide important insight into how creatine influences immune function, the research was conducted in mouse models and in human cells in the lab, not in cancer patients. The human-cell results are encouraging, but clinical trials in people are still needed to know whether these effects improve real-world cancer outcomes.

Note: These findings come from animal and laboratory studies and do not show that taking creatine treats or prevents cancer. Results may not directly apply to human health.

Support Your Immune System's Energy Supply

The research highlighted a simple but important principle: Immune cells need energy to do their job. When cellular energy falls, immune defenses become less effective. If your goal is to support healthy immune function and a strong foundation for long-term health, focus on the factors that improve cellular energy production rather than chasing quick fixes.

Think of this as a daily practice rather than a single intervention. Small actions repeated consistently create the biggest results. While the featured research focused on creatine within a cancer context, that's certainly not the only or even primary reason for maintaining a steady creatine intake. It plays a role in many aspects of health, from **supporting athletic performance and building muscle** to **boosting brain health and cognition**.

This makes sense when you consider its role in energy production, as every cell and tissue in your body needs sufficient ATP for general function. To support healthy energy production for general health, consider the following suggestions:

1. **Optimize your creatine intake from whole-food sources first —** Creatine occurs naturally in foods such as grass fed beef and lamb. These foods provide not only creatine but also protein, minerals, and other nutrients that support immune function.

   If your kidney function is normal, aim for roughly 0.6 to 0.8 grams of protein per pound (or 1.32 to 1.76 grams per kilogram) of ideal body weight, with about one-third coming from **collagen-rich sources** like slow-cooked meats or bone broth to support overall recovery and resilience.

2. **Use creatine strategically and consistently —** If you decide to supplement, choose creatine monohydrate. It remains the most studied form and has the strongest research record. Think of creatine as a rechargeable battery. The goal is to steadily maintain your reserves, not flood your system with massive amounts. Most studies that report benefits use consistent daily intake over weeks rather than aggressive loading phases or expensive supplement blends.

   For most adults, 3 to 5 grams per day is sufficient. More is not necessarily better. Your muscles and tissues can only store a certain amount, and once those reserves are full, excess creatine is simply eliminated. Higher intakes are more likely to cause bloating, water retention, or digestive discomfort without providing additional benefits.

This step is especially important if you're vegetarian or vegan because plant foods contain virtually no creatine. People who consume little or no animal protein often start with lower creatine stores and frequently experience the greatest improvements when those levels are restored. Maintaining healthy creatine levels supports energy production throughout the body, including the muscle, brain, and immune systems that depend on a steady supply of cellular fuel.

If you have reduced kidney function or chronic kidney disease, talk with your physician before supplementing. Creatine is converted into creatinine, which can raise the lab values used to assess kidney health, and it should be used under medical supervision in that context.

3. **Build stronger cellular energy with enough healthy carbohydrates —** Immune cells require energy, and energy production depends heavily on glucose metabolism. Most adults need about 250 grams of **healthy carbohydrates** daily, adjusting upward if you're physically active. Focus on ripe fruit, root vegetables, and other easily digested carbohydrate sources that support cellular energy production. Better energy availability helps every system in your body, including your immune system.

4. **Use sunlight to strengthen your body's energy-producing machinery —** Healthy immune responses depend on healthy mitochondria, the tiny structures that produce energy inside your cells. Regular sun exposure supports mitochondrial function, vitamin D production, nitric oxide release, and mitochondrial melatonin production. I recommend daily exposure to morning sunlight and sensible midday sun exposure while avoiding excessive sunburn.

   If you have consumed large amounts of **seed oils**, and other sources of **linoleic acid** (LA), avoid intense midday sun exposure until you have reduced those foods for at least six months. This is because LA is a polyunsaturated fat that oxidizes easily, builds up in your skin, and increases your risk of skin damage.

5. **Reduce the four major drains on cellular energy —** Beyond creatine itself, the broader principle is supporting cellular energy. Excess LA from seed oils, endotoxins from poor gut health, xenoestrogens from plastics, and excessive electromagnetic field (EMF) exposure all interfere with cellular energy production.

   Start with the easiest win: eliminate seed oils, including soybean, corn, sunflower, safflower, canola, and cottonseed oils, and processed foods that contain them. Replace them with traditional fats such as grass fed butter, ghee, and tallow. Every reduction in these energy-draining influences helps create a healthier environment for your immune cells.

FAQs About Creatine in Cancer Immune Defense

Q: What did the UCLA study discover about creatine and the immune system?

A: Researchers found that creatine helps fuel dendritic cells, which are immune cells that coordinate the body's response to threats. When these cells had access to creatine, they survived longer, became more active, and were better able to activate cancer-fighting T cells. The findings suggest that creatine supports important immune functions beyond its well-known role in muscle performance.

Q: How did creatine affect tumor growth in the study?

A: In a mouse melanoma model, creatine supplementation was associated with slower tumor growth and a stronger immune presence inside tumors. Researchers observed more active dendritic cells, increased activity in genes linked to immune defense, and stronger T-cell responses, suggesting that improved cellular energy helped strengthen the overall immune attack on cancer cells.

Q: Why is ATP important for immune function?

A: ATP is the primary energy source used by cells. The study found that creatine helped dendritic cells maintain higher ATP levels, allowing them to stay active and communicate more effectively with other immune cells. Without adequate ATP, immune cells struggled to perform the energy-intensive tasks required for a strong immune response.

Q: Who might benefit most from paying attention to creatine intake?

A: People who consume little or no animal protein often have lower creatine stores because plant foods contain virtually no creatine. Vegetarians and vegans frequently start with lower levels and may experience greater benefits when creatine stores are replenished. Adequate creatine intake also supports energy production in muscle, brain, and immune tissues.

Q: Does this research prove that creatine prevents or treats cancer?

A: No. The study was conducted primarily in laboratory experiments and animal models rather than in cancer patients. The findings reveal an important biological mechanism showing how creatine supports immune-cell activity, but human clinical trials are needed to determine whether these effects translate into improved cancer outcomes in people.

This article is for informational purposes only and does not constitute medical advice. Consult a qualified health care provider before making changes to your health regimen.

Sources and References

- [1, 2] iScience April 17, 2026, Volume 29, Issue 4, 115436