

# Human Hearts Can Regrow Some Muscle Cells After Severe Damage

Analysis by [Dr. Joseph Mercola](#)

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## STORY AT-A-GLANCE

- Heart attacks occur every 40 seconds in America, affecting a total of 805,000 people annually. It is characterized by blocked coronary arteries that starve cardiac muscle of blood flow
- Australian researchers found human hearts can regenerate muscle cells after heart attacks, with preserved cardiac tissue showing 7% to 8% mitosis rates (a measure of cell regeneration activity), though 25% to 50% is needed for full repair
- Hypoxia, which is the oxygen-deprived state during heart attacks, may also trigger regeneration, similar to how fetal hearts produce new cells in the low-oxygen womb environment
- Advanced heart failure reduces heart muscle cell renewal dramatically, but patients with mechanical heart pumps showed regeneration rates of 3.1% annually — six times higher than healthy hearts
- Prevention remains crucial. Strategies such as minimizing linoleic acid consumption, monitoring body fat percentage, engaging in moderate resistance training, and learning to recognize heart attack warning signs increase outcomes

According to the U.S. Centers for Disease Control and Prevention (CDC), a heart attack occurs every 40 seconds throughout America. This totals to around 805,000 people every year — 605,000 of them experience it for the first time, while the remaining

200,000 are repeat cases. Moreover, 1 in 5 people don't know they've already had a heart attack.<sup>1</sup>

But what exactly happens when you have a heart attack? Simply put, blood flow to the heart becomes severely restricted usually due to a buildup of plaque in the coronary arteries. Once a complete blockage occurs, cardiac muscles die as they also don't get blood flow. From here, symptoms such as chest pain, cold sweats, fatigue, nausea, and shortness of breath manifest.<sup>2</sup>

Treatment is centered on restoring blood flow as soon as possible to prevent further tissue death. Here lies a question that has bothered researchers for years now — once a heart attack occurs, can cardiac tissue regenerate on its own and achieve optimal function again? Evidence shows that there's a sliver of hope, but it needs to be fleshed out further.

## **The Human Heart Can Regrow Cardiomyocytes After a Heart Attack**

Experts have long been aware that certain animals can regrow their own heart cells after a heart attack. One example is zebrafish, which can actually do a complete regrowth. Meanwhile, mice have shown the ability to induce mitosis (dividing and multiplying of cells) in the affected area.

The human heart, on the other hand, was believed to be different. According to Sean Lal, Ph.D., a professor of clinical and molecular cardiology at the University of Sydney and coauthor of the featured study, medical students are generally taught that the number of heart cells you're born with remains the same throughout your lifespan or until you suffer a heart attack.<sup>3</sup>

Now,<sup>4</sup> a team of Australian researchers found that this may not be the case. Their study, published in the journal *Circulation Research*, made a big breakthrough that deepens the understanding of what we know about the human heart. Specifically, they discovered how it can regenerate new heart muscle cells (cardiomyocytes).<sup>5</sup>

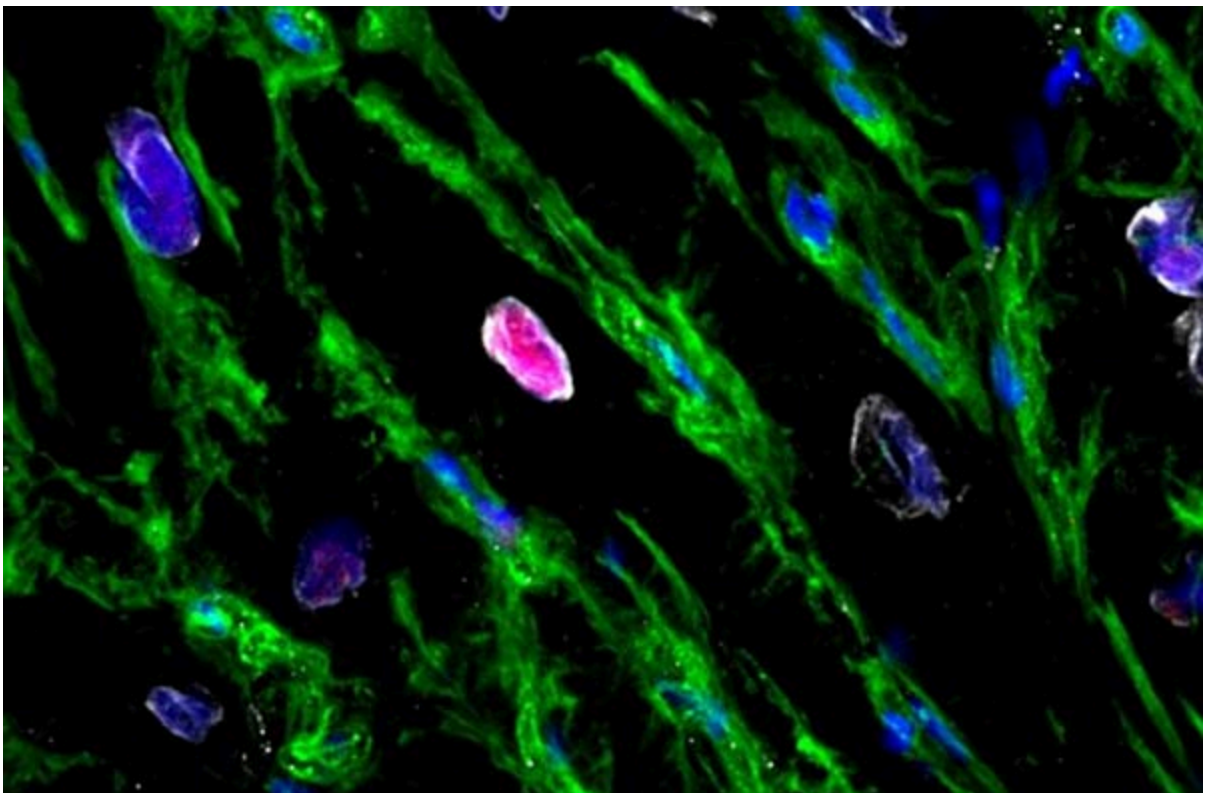
To test their hypothesis, the researchers used a heart that sat in storage for almost two decades. It was donated by the family of a 48-year-old man who suffered from a severe heart attack. He was brain-dead and on life support, but the damaged heart couldn't be transplanted into someone else.

The heart was preserved and frozen in liquid nitrogen to preserve tissue quality.

"Essentially, the tissue and cells were 'frozen in time,'" according to lead researcher Rob Hume, Ph.D.<sup>6</sup>

- **Analysis of the heart** — Using an array of analytical techniques, the researchers were able to determine how the heart underwent mitosis. According to Lal, the samples they collected from the donor heart showed a mitosis rate of 7% to 8%. But to be able to repair the heart back to its optimal state, the mitosis rate should ideally be 25% to 50%.

In the image below, you can see that the pink area is where a cardiomyocyte is regenerating. This was triggered by adding certain antibodies into the tissue, which attached to proteins that are expressed during mitosis:



- **A theory on why regeneration happens** — Lal explained that hypoxia could be the factor that triggers mitosis in the heart muscles. Basically, the very same oxygen-deprived environment caused by a heart attack also triggers regeneration in the affected area. This supports his initial theories regarding fetal hearts, noting that, "Fetal hearts make tonnes of new heart cells in utero, which is an oxygen-low environment." He connects this to his research about adult hearts:<sup>7</sup>

*"It's almost like the heart has some inbuilt memory. Maybe when you have low oxygen after a heart attack, you reprogram your heart cells to make new cells like you did when you were in utero. That is what we are exploring."*

While the experiment shows promise, the researchers acknowledge that their findings still won't be able to prevent a heart attack. However, they do hope to continue following up on their findings to create therapies that can promote better mitosis in heart cells.<sup>8</sup>

## **Heart Muscles Turn on Renewal Switches Under the Right Conditions**

A related study published in *Circulation* also looked at how your heart can make new muscle cells. The study tracked DNA signatures inside cardiomyocytes to measure actual new cell formation, not just cell enlargement.<sup>9</sup>

According to the researchers, the goal was to determine whether the adult human heart has what they called a "latent cardiomyocyte regenerative potential" and whether certain conditions activate it. The findings? Your heart's ability to replace lost cells varies dramatically depending on your physiological state, with some patients showing dramatic surges in renewal when conditions improve.

- **Framework of the analysis** — A group of patients with advanced heart failure provided the data for this analysis. The study compared their heart tissue with healthy adult hearts and then separated those who received left ventricular assist

device (LVAD) support — a mechanical pump that takes workload off the heart — to see how different environments affected cardiomyocyte renewal.

- **The enormous contrast between healthy and failing hearts** — In a normal adult, cardiomyocyte turnover sits at about 0.5% per year, meaning a small but steady replacement of muscle cells. This results in an almost 40% replacement during the entire lifespan of a human — a contrast to the theory proposed in the earlier featured study, wherein the number of cardiomyocytes remains the same.

In end-stage heart failure, that renewal rate collapses. The study reports that cardiomyocyte generation drops 18 to 50 times lower compared with healthy controls. This means once heart failure advances, your heart's natural repair machinery slows to a crawl, making recovery harder unless something shifts the internal environment dramatically.

- **A deeper look at the data** — In failing hearts, renewal fell to 0.03% per year for nonischemic cardiomyopathy and even to 0.01% per year in ischemic cardiomyopathy — the type tied to heart attacks. This corresponds to the lower rate of regeneration mentioned earlier.

Everything changes, however, in patients whose hearts recovered function with LVAD support. Among those individuals, cardiomyocyte renewal rose dramatically to 3.1% per year. This means some hearts aren't only stabilizing under better conditions — they are rebuilding themselves at a faster rate than healthy hearts normally do.

- **What's happening inside heart muscle cells** — The researchers documented that in the worst heart failure cases, DNA synthesis inside cardiomyocytes mostly produced polyploidy — extra DNA copies inside the same cell — rather than creating entirely new muscle cells.

In other words, your heart might look active at the molecular level even while failing, but the activity is misdirected. Instead of replacing lost cells, the damaged heart tends to enlarge existing cells or add extra nuclei, a process that does not restore

lost pumping strength.

- **A roadblock to regeneration** — The researchers mentioned cytokinesis (the final step in cell division where one cell splits into two) as a key chokepoint. This means that many heart cells are already entering the repair cycle, but they fail to complete it. They copy DNA, they prepare to divide, but they do not finish the split. Your ability to rebuild heart muscle depends on helping cells complete that final step.
- **Suggestions for future studies** — While the researchers were able to detect the regenerative rate in cardiomyocytes, they didn't go deep into solutions. However, they did offer suggestions that can be used as a launching pad for other experts and expand known facts in this field:<sup>10</sup>

*"[M]echanical unloading might reverse metabolic cascades that increase reactive oxygen species production. This, in turn, can reduce oxidative DNA damage and activation of the DNA damage response pathway that causes cell cycle arrest in cardiomyocytes. Indeed ... a successful approach for cell replacement strategies could be to selectively stimulate cytokinesis in already cycling cardiomyocytes."*

## **Don't Wait for a Heart Attack to Happen — Boost Your Cardiovascular Health Now**

As I often say, it's better to prevent a disease from happening in the first place instead of treating it, and this also applies to heart attacks. That said, here are my recommendations to keep your heart in top shape:

1. **Minimize your intake of linoleic acid (LA)** — In 2025, [I published a paper in the World Journal of Cardiology](#) regarding the health effects of excess LA consumption on cardiovascular health. In it, I describe how LA becomes integrated into the cardiolipin in your mitochondrial membranes, where it becomes a substrate for lipid peroxidation. This causes harmful reactive oxygen species (ROS) that eventually results in clogged arteries.

In light of this information, cutting back on LA is one of the smartest things you can do for your cardiovascular health, not to mention your overall well-being. I recommend keeping your intake below 5 grams a day, but if you can keep it below 2 grams, that's even better.

As much as possible, avoid all ultraprocessed foods, as they are cooked in LA-rich vegetable oils, such as soybean, corn, safflower, and cottonseed. To help you monitor your intake, sign up for the upcoming Mercola Health Coach app. It contains a feature called the Seed Oil Sleuth, which will track the LA in your food to a tenth of a gram.

- 2. Track your weight** — Even if your body mass index (BMI) is in a supposedly healthy range, that doesn't mean you're in the clear. [As I noted in my previous article](#), intermuscular fat eventually promotes inflammation, which increases your risk for heart attack, as well as heart failure.

Instead of relying on BMI, it's better to track your overall body fat percentage. You can use body fat calipers, which gives you a hands-on approach by measuring skinfold thickness in key areas throughout your body. When used consistently, they are reasonably accurate.

You can also use smart scales, which work by using bioelectrical impedance analysis (BIA) to measure body fat. While your current hydration levels can affect the results, they're also generally helpful for getting an overall picture of your body fat composition. But the better approach here is combining the two methods for even better tracking accuracy.

- 3. Start building muscle** — Now that you've gotten an idea on your current fat levels, how do you lower it? One effective method, which you can start doing right away, is resistance exercise or strength training.

Research shows that consistent resistance exercise decreases fat infiltration in your muscles. In addition, the eventual increase in your overall muscle density is linked to better cardiovascular health and longevity.<sup>11,12</sup>

However, take care when it comes to lifting weights — it would be wise to keep it in moderation. [In my interview with Dr. James O'Keefe](#), he noted that 130 to 140 minutes of strength training per week makes you lose the longevity benefits of exercise. Based on our conversation, the sweet spot for lifting weights is 40 minutes once a week, or 20 minutes twice a week on non-consecutive days.

- 4. Know the signs of a heart attack** — Even if you do everything correctly, it's still wise to familiarize yourself with the signs of a heart attack. This will allow you to get proper help right away.

For more in-depth information on this topic, read "[How to Spot and Treat a Heart Attack](#)." It contains other helpful tips that can help reduce tissue damage once a heart attack occurs, such as keeping methylene blue and sublingual melatonin close to you.

## **Frequently Asked Questions (FAQs) About Cardiomyocyte Regeneration After a Heart Attack**

**Q: Can the human heart regenerate after a heart attack?**

**A:** Yes, research shows the heart has regenerative capacity, albeit limited. Australian scientists found 7% to 8% of heart muscle cells actively going through mitosis in damaged cardiac tissue, though full repair would require 25% to 50%. Low oxygen during heart attacks may trigger this regeneration.

**Q: How does heart failure affect the heart's ability to repair itself?**

**A:** Heart failure dramatically reduces regeneration. Healthy hearts replace about 0.5% of muscle cells yearly, but advanced heart failure drops this to 0.01 to 0.03%, which is up to 50 times lower than normal.



**Q: Can mechanical heart pumps improve cardiac regeneration?**

**A:** Yes. Patients using left ventricular assist devices (LVADs) showed renewal rates of 3.1% per year — six times higher than healthy hearts. Based on the findings, reducing the heart's workload allows natural repair machinery to function better.

**Q: Why do heart cells fail to complete regeneration?**

**A:** The main roadblock is cytokinesis, which is the final step where one cell splits into two. Many heart cells copy DNA but cannot complete division. Future therapies may target this chokepoint.

**Q: What can I do to prevent heart attacks?**

**A:** Minimize linoleic acid (LA) intake (below 5 grams daily) by avoiding ultraprocessed foods, track body fat percentage, engage in moderate resistance training (40 minutes weekly), and learn to recognize heart attack warning signs.

## Sources and References

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- <sup>1</sup> [Centers for Disease Control and Prevention](#)
- <sup>2</sup> [Mayo Clinic, Heart Attack](#)
- <sup>3, 6, 7</sup> [The Age, January 18, 2026](#)
- <sup>4</sup> [Circ Res. 2026 Jan 16;138\(2\):e327486](#)
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- <sup>8</sup> [Medical Xpress, January 19, 2026](#)
- <sup>9, 10</sup> [Circulation. 2025 Jan 21;151\(3\):245-256](#)
- <sup>11</sup> [European Heart Journal January 20, 2025](#)
- <sup>12</sup> [The Journal of Gerontology Series A: Biological Sciences and Medical Sciences. 2015 Apr 2;70\(9\):1133–1140](#)