

The protein that reveals the heart's ability to repair itself: Thymosin Beta-4

Beyond all the miraculous systems in the body, the heart by itself is one of the finest examples of flawless creation. No similar artificial mechanism that "can keep someone alive" has thus far been built, despite all the recent scientific advances. With the cells that comprise it, its special valve systems and the manner in which the opening and closing of these valves is regulated, the heart is an organ with exceptionally complex and special systems. No other organ can do anything like the work it performs.

- **What happens in the event of an impairment in the functioning of this organ?**
 - **How can the heart repair itself following a heart attack?**
- **What role does the thymosin beta-4 (TB4) molecule play in the heart's self-repair?**

Although it is only 22 days since its creation, a small collection of cells on the left side of the fetus begins to move. This collection of cells will never stop now, not for a very long time. It will never tire. It will beat approximately 70 times per minute, some 35 million times per year, and around two trillion times over the course of an average life span. It will pump some 227 million liters of blood over the course of a lifetime. It will tirelessly feed all the organs of the body through the network of blood vessels. The heart functions perfectly in every body because Allah so chooses, and everything it does is under our Lord's control at every moment. Allah exhibits His artistry of detail in the human body and reveals this in a verse:

"Allah brought you out of your mothers' wombs knowing nothing at all, and gave you hearing, sight and hearts so that perhaps you would show thanks." (Surat an-Nahl, 78)

This organ, the foundation of life, also uses blood to nourish itself. However, in order to remind people of their weakness, our Lord may sometimes cause the vessels that feed the heart to narrow, using such natural causes as cholesterol (blood fats), other fats, calcium and combinations of other substances. This then leads to impaired circulation in the blood vessels (coronary arteries) that supply the heart, finally resulting in a heart defect. When the narrowing of the vessels turns into complete blockage over the course of time, the result is severe chest pain and a heart attack. This generally proves fatal, though some victims do survive. But their hearts still suffer damage from the attack.

Recent studies have once again shown Almighty Allah's love for and mercy on His servants. Because a protein that the heart produces during the developmental stage in children enables the damaged heart to be repaired and increases the vessels supplying it.

The Healing Power of the Heart: Thymosin Beta-4

During a heart attack, heart cells die when the flow of blood to the heart is suddenly cut off, resulting in irreparable damage. This damage persists in the form of a decreased quality of life in the patient's later life.

Until recently it used to be thought that, unlike other organs, the heart had no ability to repair itself. Today, however, we know that this damage can be put right by the body. The protein thymosin beta-4 (TB4), which plays a key role in the development of the heart in children, activates stem cells that are lie dormant in the adult heart. These tiny proteins, known as thymosin, which comes in two forms in living tissue, $\alpha 1$ and $\beta 4$, possess the ability to reprogram cells in the body. The protein is today administered in the form of a drug, and sends the stem cells a code regarding the repair of the heart. The heart thus heals itself without the need for other

treatment. Administered in pharmaceutical form, this protein improves heart performance by up to 25% by causing stem cells to turn into heart and artery cells. It repairs the damaged heart cells, increases the arteries supplying the heart and permits the muscles to repair themselves.

Allah, the Creator of All, Is Most Great

Events in our body that we are unaware of, and whose existence we have usually never even heard of, take place inside us with the greatest regularity. Our heartbeat, essential for our survival, is not something we initiate or maintain of our own will. Our heart is one of the organs miraculously created by our Lord. This organ begins beating as a collection of cells when a person is still in his mother's womb, and continues to flawlessly discharge its duties until the end of that person's life.

Research in recent years has revealed that in the event of a defect arising in this immaculately functioning organ, various proteins go into action to repair it. However, proteins themselves possess no such medical knowledge with which to identify defects developing in the heart, and lack the consciousness to save a person's life by taking such precautions. Yet they are present in everyone's body and ready to serve the same function. A protein with such superior properties is neither the product of human intelligence nor of any supposed evolutionary process. It was created by Allah, He who bestows order, glory and perfection on all He creates. Allah is He Who meets the needs of all created things (*Kafi*), He Who enfolds them (*Muhit*) and Who is mighty enough to do all that He wishes, in the manner He wishes (*Kadir*). He is the only One to be thanked and praised (*Hamid*). He is the One who creates without previous models (*Bedi*). This is revealed in the following verse:

"the Originator of the heavens and earth. When He decides on something, He just says to it, 'Be!' and it is." (Surat al-Baqara, 117)

The heart is made up of special muscles that never tire. If your heart muscles were to tire in doing things that cause you fatigue, then you could never do such routine day-to-day activities as cleaning, sport, climbing up stairs and the like. You would be exhausted before you even began. But apart from exceptional diseases, this never happens. Because Allah manifests His infinite mercy on His servants by bestowing tirelessness on the muscles of the heart. There is no doubt that this is one of the matchless works of our Lord, who knows all things down to the finest detail and Who manifests His omniscience in every detail. The omniscience of Allah is revealed in the following verse:

"... My Lord encompasses all things in His knowledge so will you not pay heed?" (Surat al-An'am, 80)

There is a highly systematic mechanism in the heart. That mechanism is essential for human life. Otherwise, a single flaw arising in the system could spell the end of the life of the person concerned. The most important of the heart's mechanisms is the pumps on its right and left. There are also auricles and ventricles on both sides of the heart. The small pumps on either side are the auricles, while the ventricles constitute the large pumps. The left side of the heart is occupied with clean blood. It is the task of the left auricle and ventricle to ensure that incoming blood reaches the organs and tissues. The right side of the heart is occupied with used (dirty) blood. The right auricle and ventricle send the blood to the lungs for cleaning.

The Heart Is An Immaculate Organ Created By Almighty Allah

- **It Pumps Blood with Ease:**The heart is a piece of flesh the size of a fist composed of water, fats and proteins. This piece of flesh possesses a more perfect and complex system than the most advanced technological pump that all the experts in the world could produce using their computers. This matchless piece of flesh is strong enough to cause blood to spout up to three meters in the air.
- **It Identifies Oxygen Requirements:**The heart pumps as much blood as it calculates the body needs. This wondrous organ pumps just four to six liters of blood per minute when the body is at rest. That is enough for the person at that time as the cells in the body do not require that much oxygen just then. But someone doing strenuous exercise needs more oxygen. Oxygen needs to be transmitted to the cells more quickly. The heart immediately

identifies this need and begins beating faster. The amount of blood pumped by the heart increases by four to seven times during exercise.

- **It Supports Tiring Muscles:** The heart never stops working, but sometimes it works even harder than usual. When one runs, the amount of blood pumped by the heart can rise to 2,270 liters an hour. It can raise its work rate from 70 beats per minute to 180 per minute in order to provide the oxygen our tiring muscles need. It can increase the amount of blood supplied to the tissues five-fold. When our other muscles engage in a tiring activity, the heart accelerates to support them.
- **It Coordinates the Auricles and Ventricles:** The system in the heart has perfect timing. That is the result of co-ordination and communication among the cells that comprise the heart. The noteworthy thing here, of course, is the "intelligence" in the cells that act under the inspiration of Allah. The cells that make up the heart send a current to the other side of the heart at a speed of some 60 centimeters per second. The signal is sent from a region known as the S.A. node. The cells that make up the S.A. node produce the signal in just 1/14 of a second. There are cells that produce a second current here, known as the A.V. node. The current sets the two auricles into motion as it passes and causes them to contract in order to collect blood. When the electric current, that is still moving, reaches the ventricular muscles, special fibrous cells in the muscle tissue between the right auricle and the right ventricle halt it. This causes a delay in the current reaching the ventricle. The speed of the current falls to 20 centimeters per second and it begins being transmitted in 1/16 of a second. This delay is exceedingly important. Because of it, the auricles fill with blood before the ventricles contract, and are thus able to prepare themselves to pump blood. This is the secret of the synchronized action of the heart.

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