The Search for the Physical Cause of Jesus Christ's Death

Using both modern medical knowledge and accounts in the Gospels to study Jesus' death increases our appreciation for the Atonement.

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The physical cause of the death of our Lord has occupied the minds and fueled the pens of medical theorists and theologians for centuries. The search for the answer to this diagnostic dilemma has left a windfall of literature and theories that is of tremendous interest to students of the life of Jesus Christ. This essay will review some of the more prominent theories on the physical cause of the death of Christ: the ruptured heart theory, the asphyxia theory, the cardiovascular collapse theory, the aspiration theory, and the fatal syncope theory.[1] Each of these theories has its merits, along with its probable flaws. I will also address and reject the theory that Jesus did not die on the cross but rather was resuscitated by his followers and then feigned resurrection.

The Ruptured Heart Theory

The ruptured heart theory is, without doubt, the most well-known theory on the cause of Christ's death. It is certainly the one most familiar to the Latter-day Saint community as a result of its endorsement by James E. Talmage.[2] Dr. William Stroud popularized this theory in 1847,[3] and it was on Stroud's work that Elder Talmage based many of his conclusions.

Understanding cardiac rupture can be conceptually difficult without a basic knowledge of how the heart works. At the simplest level, the heart is a hollow pump surrounded by an inflexible fibrous sac called the pericardium. The heart and its vast network

of arteries and veins represent a self-contained system that circulates blood to nourish the organs of the body. In a cardiac rupture, a hole in the wall of the heart causes blood to leak into the pericardial sac, which quickly stops the pumping action of the heart. This phenomenon, known as cardiac tamponade, is rapidly fatal. When cardiac tamponade strikes, many victims will cry out loudly, quickly lose consciousness, and then die—all reminiscent of the way Jesus died.

Stroud's theory is based on the incident described in John 19:34: "But one of the soldiers with a spear pierced his side, and forthwith came there out blood and water." John's observation contradicts the maxim that "a corpse does not bleed"[4] and places special significance on the emergence of both blood and water from the wound. Stroud's theory is relatively simple: The intensity of Jesus' suffering on the cross caused his heart to rupture, resulting in his rapid and dramatic death from cardiac tamponade. The blood in the pericardium then separated into clot and serum and emerged under pressure as separate components when the soldier's javelin penetrated the pericardium.

It is certainly true that when blood is left to sit in a test tube it will eventually separate into an amber-colored serum and dark red clot. Nevertheless, with few exceptions, blood does not clot in the pericardium after cardiac tamponade. Even if this were a possibility, the one or two hours at most that intervened between death and the spear thrust would have been insufficient for the separation to occur. Finally, it is difficult to understand how a blood clot, which has the consistency of gelatin, could flow from the wound.[5] In all likelihood, the accounts describing the presence of blood and water, which seemed to Stroud to pinpoint the cause of Christ's death, led him to an erroneous conclusion.

A more likely explanation for the emergence of both blood and water from the wound assumes separate sources for the fluids—the blood emerging from the heart and clear fluid emerging from either the pericardium or the chest cavity. In the case of the clear fluid, there is normally a small amount of watery fluid in the spaces that surround the lung (pleural cavity) and the heart (pericardial space). Excessive and pathologic accumulation of this fluid is nonspecific and can occur in a variety of conditions such as

heart failure, chest trauma, and shock. In the Lord's case, the ordeals of crucifixion could have caused an accumulation of pericardial or pleural fluid. A javelin thrust could penetrate the pleural cavity, the lung, the pericardial space, and the heart itself, resulting in the drainage of the separate fluids under the influence of gravity. The biblical record suggests that the wound was large enough for this kind of drainage to occur; remember that Thomas was able to thrust his hand into Christ's side (see John 20:27).

Other aspects of Stroud's theory do not stand up well to our current medical understanding of cardiac tamponade. The phenomenon is not known to occur in the absence of some underlying disease of the heart. The overwhelming majority of cases of cardiac rupture seen today occur in the setting of a heart attack, or myocardial infarction.[6] In first-century Judea, it would have been stunningly rare for a healthy man in his thirties to experience a heart attack. Furthermore, when cardiac tamponade complicates a heart attack, it usually does not occur until seven to ten days following the infarction. The scriptural record offers no suggestion that Jesus was in any way ill in the week prior to his crucifixion. It is important to concede that anything, including a heart attack, could have happened during Christ's atoning agonies in the Garden of Gethsemane twelve hours before his crucifixion. But it would be difficult to attribute the alleged cardiac rupture to a heart attack that occurred in Gethsemane only twelve to eighteen hours earlier.

It should be noted that Stroud never suggests that Jesus suffered a heart attack. Yet he fails to offer an explanation other than the intensity of Christ's suffering as a cause for the rupture. Since it is impossible to know the physical consequences of Christ's eternal atonement, it is impossible to further critique this argument from a medical perspective.

Cardiac tamponade is known to occur in other settings. Dr. David Ball suggests that Christ could have died as a result of traumatic cardiac tamponade and cites several case studies to support the theory. He argues that Christ's numerous falls during his walk to Calvary could have been the source of the chest trauma that caused the syndrome. With his arms tied to the crossbar, Jesus could not shield his body and would have fallen forward to the cobblestone road under the weight of the load. In this type of

trauma, the heart is compressed between the breastbone (sternum) and the spinal column. Ball suggests that this trauma weakened the wall of the heart and caused it to rupture.[7]

The problem with Ball's theory, like Stroud's, relates to time. The theory would require cardiac rupture to occur only six to seven hours following the trauma. The modern experience with these injuries suggests that traumatic cardiac rupture occurs most often at the time of injury or, less commonly, days following the injury. The six- to seven-hour time frame simply does not fit well. Although the various cardiac rupture theories may have great appeal from a sentimental view, supporting a traditional broken heart symbolism, modern medical thinking does not substantiate that particular physical diagnosis.

The Asphyxia Theory

Virtually every medical treatise on the subject of crucifixion and most of the experiments that simulate crucifixion in healthy volunteers agree that crucifixion causes a profound disruption of the victim's ability to breathe. This knowledge has led many medical theorists to postulate asphyxia as the cause of Christ's death.[8]

This disruption of breathing relates to the way the chest wall is stretched when the victim is suspended from the cross. In a normal person, the act of inhaling, or inspiration, occurs with the coordinated contraction of the diaphragm and outward expansion of the chest wall. When the chest and diaphragm relax, the chest spontaneously deflates.

In the *cruciarius* (the Latin term for a victim of crucifixion), the chest was stretched into the same position that it assumed during normal inspiration. Expiration could not occur spontaneously because the chest was held in the inspiration position by the weight of the body pulling on the arms. In essence, the positioning of the body on the cross transformed the normally effortless act of breathing into something that required tremendous energy. Incomplete emptying of the chest could occur by contracting the muscles of the abdominal wall to force air out of the chest; the diaphragm will only work for inspiration. Adequate expiration could not occur without lifting the body up either by pulling up with the arms or pushing up on the nailed feet.

While hanging by the hands, the victim's breathing would be shallow, rapid, and inefficient. With time, oxygen levels in the blood would fall and carbon dioxide levels would rise. Intense air hunger would ensue and prompt a heroic effort on the part of the cruciarius to lift the body up to facilitate normal breathing. A period of frantic, gasping respiration would rescue the victim from suffocation. Then with time, the legs would fatigue and force the cruciarius to hang by the arms, thereby ushering in another period of tortured breathing and air hunger.

The rhythmic cycle of breathing would continue for many hours or even days. To the experienced eye of the executioner, this cycle served as a useful barometer of the overall condition of the condemned and could probably be used to predict the time of death. To the onlooker, it was a powerful visual deterrent of criminal conduct and a sober reminder that the ruling authorities would not tolerate disruptions that threatened their political or religious order.

The agonies exacted by this form of capital punishment were unspeakable. They resulted not only from the air hunger and respiratory distress already mentioned, but also from multiple other factors: intense thirst, severe muscle cramping, and traumatic injury to the nerves, bones, and soft tissues of the feet and wrists caused by the nails. Death came slowly and only after the victims were so weak that they could no longer lift the body to rescue themselves from asphyxia. As the victims weakened, they lifted themselves less frequently. In time, carbon dioxide levels rose and oxygen levels fell, and the victims gradually slipped into a coma. Death, when it finally came, was quiet and peaceful.

It should now be apparent why the practice of breaking the legs of the cruciarius was an effective means of accelerating death. This maneuver would make it impossible for the crucified to "stand up" and breathe, even if the victim still had sufficient strength to do so.

With this background in mind, it is now possible to critically analyze the asphyxia theory in light of the details provided by the Gospel narrators' accounts of Christ's crucifixion. Although none of the Gospel narratives give a direct description of Christ's physical condition on the cross, they do so indirectly. All four writers agree that Jesus spoke from the cross. Since vocalization is only

possible during expiration, he had to have sufficient strength to lift his body and speak out above the clamor that surrounded him. On each of the seven occasions where his words were recorded, he spoke deliberately and used the occasion as a teaching moment. Perhaps the point is best illustrated by reviewing the words Christ spoke immediately prior to his death. Matthew, Mark, and Luke all describe them as being uttered forcefully and relate that they were quickly followed by his death (see Matt. 27:50, Mark 15:37, and Luke 23:46). These words were not the final whispers of a near-comatose man in the terminal stages of asphyxia.

Asphyxia caused by crucifixion closely resembles a severe asthma or emphysema attack. Normally, patients are restless, panicky, and feel like they cannot get enough air. They may be extremely agitated initially, but as the condition worsens, they become more sedated and do not speak. Every effort is devoted to breathing. Finally, victims gradually become drowsy, slip into a coma, and die quietly if the process is not reversed.

Although victims of crucifixion are very similar to asthmatic or emphysema patients in some ways, they were different in one very important respect: they could reverse their inability to fully exhale by pushing down on the nails in the feet, easing the pull on the chest that paralyzes normal respiration. This maneuver allowed normal respiratory mechanics to ensue and temporarily rescue the victim from impending coma and death.

Death from asphyxia and the cardiovascular instability caused by slow suffocation were probably the cause of death in the vast majority of the men and women who died by crucifixion. However, it could not have been the cause of Christ's death. Although obviously weakened and suffering from his great ordeal, he still had sufficient strength to lift himself, speak out, and be heard above the din of his enemies who encircled the cross. His sudden and unexpected death bears little resemblance to the gradual decline and quiet passing of one that dies by slow asphyxia.

The Cardiovascular Collapse Theory

The most prevalent modern theory on the cause of Christ's death is that of cardiovascular collapse. The numerous supporters

of this theory suggest that Jesus died of profound shock.[9] The scourging, the beatings, and the fixing to the cross would have left Jesus dehydrated, weak, and critically ill. Add to these insults the tremendous energy expenditure that crucifixion exacted for things as simple as breathing, and the conclusion is intuitive. The stage was set for a complex interplay of physiological insults to be present simultaneously: dehydration, massive trauma and soft tissue injury (especially from the prior scourging), inadequate respiration, and strenuous physical exertion. All acted together to initiate a vicious cycle of incremental and irreversible decline. Eventually the severity of the shock would be such that blood pressure would fall below levels required to perfuse the brain, and coma would result. In fact, cardiovascular collapse is inseparably connected with the abnormalities that accompany gradual asphyxia. This theory supposes only that the cause of coma was the metabolic complications of shock rather than those of asphyxia.

For this reason, the contentions used to renounce the asphyxia theory are exactly the same as those used to question the cardiovascular collapse theory. Again, the biblical account of Christ's death clearly describes a sudden, unexpected death that was immediately preceded by a loud cry and a statement to the onlookers surrounding the cross. Jesus showed none of the hallmark signs of one dying from profound shock.

The Aspiration Theory

The next two theories, although less widely mentioned, are truly fascinating, and stem from the passage in John 19:28–30. In this account, John places the death of the Lord immediately following the administration of the drink of vinegar that was offered to relieve his thirst. This account has caused some to speculate that the drink was the proximate cause of the Lord's death.

There are several possibilities whereby drinking could result in sudden death. The most common scenario would be aspiration of the drink into the lungs rather than the stomach. When aspiration of a sufficient volume of fluid occurs, it can cause suffocation. Alternatively, it could have provoked a coughing fit that proved fatal when added to the already labored breathing pattern caused by crucifixion. Yet, the Gospels discredit both possibilities. A sponge

on the end of a hyssop stalk could not hold sufficient fluid to cause suffocation. Furthermore, John does not describe a violent paroxysm of labored breathing or coughing, but rather states that "he bowed his head, and gave up the ghost" (John 19:30).

The Fatal Syncope Theory

Could the drink of vinegar have precipitated a fainting spell, or syncope, and been the cause of Jesus' death? The notion that one could precipitate sudden death by offering the cruciarius a drink has its basis in ancient writings on crucifixion.[10] The executioners would even go so far as to prevent onlookers from offering the victim anything to drink so as to maximize the duration of their suffering. The current understanding of syncope also supports the possibility.

Syncope occurs when the blood pressure falls precipitously. It is more likely to occur in states of dehydration, shock, and severe pain or in association with disorders of the heart or nervous system. It can be precipitated by fear, anxiety, pain, a strong gag reflex, or prolonged upright posture. Syncope would have been rapidly fatal during crucifixion because it would make it impossible for the victims to lift themselves to breathe. Furthermore, the victims' prolonged upright position would exaggerate the lack of blood flow to the brain. A careful review of the scriptures shows that Christ's condition was characterized by many of the factors that can predispose a body to syncope. It is a very real possibility that a gag reflex to the drink of vinegar could have induced syncope in the Lord.

There is, however, one point that is difficult to explain using this theory. It again relates to the consensus conveyed in the reports of Matthew, Mark, and Luke regarding the Lord's words immediately prior to his death. In isolation, the account of John is compatible with death due to fatal syncope, but in the context of the other Gospels, it is not. If Jesus had fainted immediately prior to his death, his body would have slumped down, respiration would have ceased, and he would have suffocated. It would have been impossible for him to lift himself up to exhale and speak. The faint, in any case, would have been silent.

The Resuscitation Theory

This theory states that Jesus did not die on the cross but rather recovered spontaneously in Joseph's tomb or was revived and spirited away by his followers. Like many of the theories offered thus far, it has many advocates, whose views have been circulating since the late nineteenth century.[11] The argument begins with the fact that on Sunday morning the tomb was empty. This detail is a matter of record and a point that is not even disputed by the Jews that orchestrated Christ's judicial murder.[12] The dispute begins with whether the hands that rolled back the stone were human or heavenly.

Contemporary medicine's most vocal advocates of the resuscitation theory are Margaret and Trevor Lloyd Davies, who suggest that profound shock resulted in unconsciousness on the cross and led to a premature entombment. Then, in the cool and secrecy of the tomb, Jesus recovered or was revived by his followers and then disappeared from the area. The loud cry before his collapse was merely a heavy sigh that coincided with his loss of consciousness. They openly question John's medical credibility because of his account of the resurrection of Lazarus. They argue that the wound in Christ's side is overstated and may not have occurred at all. It could not have been a wound to his heart, for this would have irreversibly upset the balance of one so precariously perched between life and death. Instead, they favor a superficial wound, perhaps nothing more than a bored soldier draining a blister left over from the scourging. Finally, to explain the reports of Christ's numerous subsequent appearances, they call on mass hallucination rather than resurrection.[13]

In most cases, the believing Christian's reaction to theories such as this is initially one of outrage. However, such a reaction almost always obscures one's ability to critically assess the theory for its merits or flaws. The common thread that binds the resuscitation theories in all their varieties is the fact that the events that transpired after the death of Jesus Christ cannot be explained by current scientific knowledge. The need to explain Christ's resurrection could be done away with by arguing that he never died in the first place. Rather than addressing the central question, they shift

the focus to one that can be addressed more comfortably from within the paradigm of strict allegiance to the scientific method.

A detailed discussion of why the resuscitation theory is unacceptable is largely irrelevant. After all, from the outset, this paper has been written for the believer rather than the skeptic. However, since some imply that it is ludicrous to consider any theory that embraces the reality of the resurrection from a scientific perspective,[14] I shall point out some of the glaring inconsistencies in the resuscitation hypothesis. My rebuttal's only requirement is acceptance of physical events portrayed in the Gospels of Matthew, Mark, Luke, and John.

That an unconscious but still living Jesus was able to make this recovery within thirty-six hours of being crucified is no small feat. Unless he were assisted by some unknown co-conspirator, Jesus would have had to uncover himself from beneath many pounds of embalming spices and then unbind the linens that were wrapped around his limbs and body. He would then have had to remove the large stone that blocked the entrance to the tomb and still escape the notice of the sentries at the tomb's entrance. His recovery also would have required sufficient strength to walk the eight-mile journey to Emmaus within thirty-six hours of being crucified. Considering how critically ill Jesus was at the time of entombment, this type of recovery goes beyond the recuperative capacity of a mortal body.

Additional arguments are equally problematic for this theory. We should not forget that the act of breathing on the cross was far from subtle. It required periodic lifting of the body to prevent asphyxia. As a result, the unconsciousness that is the foundation of the theory would have been fatal or permanently damaging in its own right.

The early death of Jesus (see Mark 15:44) represented a glaring departure from the usual crucifixion. If Pilate, from the sanitized environs of Herod's palace, recognized the oddity of Christ's early death, we must assume that it was even more apparent to the executioners. I envision a group of hyper-vigilant and suspicious soldiers gathering around the foot of Christ's cross. They would have watched with the eye of experience and not hastened to

conclude that he had died hours ahead of the expected time. Surely, the soldiers relegated to execution detail knew their profession and understood well the meaning of "dead."

Finally, with regard to the witnesses to whom Christ appeared after the crucifixion, no one disputes that an emotionally traumatized person can experience hallucination. But to suggest that this experience occurred simultaneously in over five hundred individuals (see 1 Cor. 15:6) and on multiple other occasions in other group settings raises serious doubts about the doctors' objectivity. It is this loss of objectivity and surrender to personal bias that results in the conclusion being written before the research is complete.

The concluding remarks of Margaret and Trevor Lloyd Davies are as follows: "Faith does not require the abandonment of thought or the assent to concepts not scientifically acceptable. The Church will be stronger if it accommodates proven knowledge within its creeds. If it does not, all that is left is blind belief, far beyond the credulity of most people."[15] Indeed, they correctly point out some of the perils of blind faith. However, they fail to point out that it is equally dangerous to have blind faith in the ability of science. It is crucial to remember that in no field is scientific knowledge complete. To place supreme confidence in the ability of science to explain everything around us is naive and ensures that sooner or later a serious mistake will be made.

The Lord's Death in Perspective

The assertion that the exact cause of Christ's death really does not matter is, of course, valid. It is a detail that could be omitted from the story without significantly changing the importance of the overall message. When this line of reasoning is taken to an extreme, the same could be said of almost everything we know about the Lord. The only details of his life that are of primal significance are that he did live, that he did atone for us, and that he was resurrected. These few details tell us he fulfilled his part in the plan of salvation.

However, the exercise of studying the nuances of details transforms ancient manuscripts into living words of counsel. It is

the details that bring long-dead men and women to life in our minds. The intimacy of our relationship with the Lord is in large part predicated upon our study of the details of his life and teachings. In this context, any question that serves to deepen our understanding of the Lord's life is of great value to all those who seek to know him and understand him.

A separate line of reasoning argues that the exact cause of the Lord's death is a moot concept since Jesus alone determined the timing and nature of his death[16] and reminds us that Jesus himself stated, "No man taketh it [my life] from me, but I lay it down of myself. I have power to lay it down, and I have power to take it again" (John 10:18). Christ's unique ancestry made him at once both a man and a God and left him in full control throughout the entire ordeal. This point is critical to the entire discussion and should not be overlooked.

Yet I believe it is reasonable to assume that the Creator of this world and God of heaven and earth would abide by the same laws that maintain and govern his creation. Jesus' mortal body would therefore be subject to the same laws that govern all mortals. Once Christ suspended his godly power to maintain his life under the lethal weight of an eternal atonement, standard physiological principles and laws would be operative. After all, it is Christ's human side rather than his immortal side with which we most closely relate. We cannot fully identify with the death of the God that died on Good Friday, yet it is much more within our reach to identify with the man.

I am confident that any theory on the cause of Christ's death, including mine, which follows, is vulnerable to the criticisms of a new generation of scholars with revised editions of medical textbooks. It is therefore important that the exercise not be invested solely in a search for a cause of death. If this search for enlightenment is to provide anything more than intellectual curiosity and vigorous debate, it must attempt to bridge the gap between the secular and the spiritual. To aspire for something less than this goal dilutes the experience and calls into question its merit. This quest is the basis for my theories on the cause of Christ's death.

The Cardiac Arrhythmia Theory

For me, the most important details surrounding Jesus' death can be summarized in a few lines. First, it was premature compared to the usual crucifixion pattern. Second, he had sufficient strength to lift his body and speak out loudly immediately prior to his death. Third, his death was sudden and unexpected. A viable theory must suit these fundamentals.

My review of the scriptural accounts has convinced me that Christ's death was cardiac in nature, but I maintain my belief that it was not due to cardiac rupture, a heart attack, or cardiovascular collapse. Instead, I believe it was due to a cardiac arrhythmia.

A cardiac arrhythmia is an acceleration of the heart's beating motion to rates that dramatically impair the heart's ability to pump blood. Before blood can be pumped out of the heart to provide oxygen and nutrients to the brain and other organs, blood must enter the heart and fill the pumping chambers. Malignant arrhythmias represent one of the most common causes of sudden cardiac death because they rapidly decrease the flow of blood from the heart to levels that approach zero. This drop may occur because the heart beats so quickly that it does not allow sufficient time for the heart to fill with blood or because the beating motion of the heart becomes chaotic and uncoordinated. In either case, the result is the same. As soon as the cardiac output decreases to levels that prevent blood flow to the brain, unconsciousness develops (after seven to ten seconds of pulselessness), and death rapidly ensues.[17]

The most deadly arrhythmias are ventricular tachycardia and ventricular fibrillation. Today these arrhythmias are most commonly seen in conjunction with underlying heart disease such as chronic heart failure or heart attack. In fact, the reason one-third of heart attack victims die prior to arrival at the hospital relates to development of a fatal arrhythmia. But arrhythmias can also be seen in other settings. There is a wealth of scientific evidence to suggest that a fatal arrhythmia could be precipitated by metabolic complications that are thought to occur during crucifixion.

Arrhythmia's most notable provocateurs, which almost certainly occurred during crucifixion, include high blood potassium

levels and an excessive accumulation of acid in the body (acidosis). High potassium levels can result from dehydration-induced kidney failure or leakage of potassium from damaged cells. Even brief simulations of crucifixion in healthy young men resulted in significant damage to muscle cells, probably the result of the intense physical exertion and severe muscle cramping that occurred on the cross.[18] This type of muscle injury, exaggerated further by flogging or other trauma, releases large amounts of potassium into the blood from the damaged cells. Furthermore, in the setting of severe dehydration, potassium is poorly cleared from the blood.

High potassium levels alone would be sufficient to cause a fatal arrhythmia. Arrhythmias that result from high potassium levels usually begin as ventricular tachycardia. Although very dangerous, this arrhythmia may allow enough cardiac output to maintain consciousness, especially in a young person with a healthy heart. However, with time and further increases in potassium levels, ventricular tachycardia usually degenerates into ventricular fibrillation. Ventricular fibrillation is an arrhythmia in which cardiac output falls to zero due to chaotic electrical activity in the heart; it is rapidly fatal.

Acidosis occurs with any form of shock and would be worsened by dehydration, trauma, and the abnormal breathing pattern seen in crucifixion. Several hours on the cross would lead to profound acidosis, which can worsen high potassium levels and can make the heart "irritable" and prone to arrhythmia. The stage was set perfectly for Jesus to experience cardiac arrest due to an arrhythmia.

Cardiac arrhythmia is compelling as a potential cause of the Lord's death because its onset is often sudden and unpredictable. It may also occur in the absence of any underlying heart disease. Of interest is the fact that many patients who experience malignant arrhythmias have a foreboding that something is wrong before they collapse. This may relate to the patient's feeling palpitations, being aware of a rapid heartbeat, or having a premonition of an impending loss of consciousness. With the onset of this type of arrhythmia, it is not uncommon for patients to cry out or frantically search for help seconds prior to their collapse and death. Finally, when these malignant arrhythmias occur, they are rapidly fatal.

The Broken Heart

In light of the abundant, albeit circumstantial, evidence in support of an arrhythmic death, we may conclude that the psalmist spoke well in saying "Reproach hath broken my heart; and I am full of heaviness: and I looked for some to take pity, but there were none; and for comforters, but I found none" (Ps. 69:20–21). Indeed, the entire ordeal was borne in solitude notwithstanding the throng of people at the foot of the cross. For, even the Father's presence was withdrawn at the pinnacle of his suffering on the cross.[19] Consider the irony of the notion that Jesus himself died of the very thing he requires of those he would redeem: a broken heart and a contrite spirit that bears the heaviness of others' burdens (see Ps. 51:16–17, 147:3; 2 Ne. 2:7; and 3 Ne. 9:20).

My feelings about the "broken heart" theory may seem as much figurative as they are based on medicine and physiology. However, I stand by my assertions that they have merit from a medical perspective. Yet, more important than all of that is the way that the exercise increases our understanding of Christ's atonement, death, and resurrection. As we study and ponder all that we can about our Savior, our hearts swell with gratitude for his condescension and his infinite love. Our empathy for the Lord fulfills the pleadings of a familiar hymn: "More tears for his sorrows, More pain at his grief."[20] Once this change has occurred, our perspective is dramatically altered, and the quest for the answer to the question of how Jesus died becomes, above all, the medium through which our appreciation for the Lord's sacrifice is greatly deepened.

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NOTES

[1]Additional minor theories have been offered, but it is beyond the scope of this paper to visit them all.

[2]James E. Talmage, *Jesus the Christ* (Salt Lake City: Deseret Book, 1981), 668–69.

[3]William Stroud, *Treatise on the Physical Death of Jesus Christ and its Relation to the Principles and Practice of Christianity* (London: Hamilton and Adams, 1847), 73–156.

[4]Origen (A.D. 185–254), cited in John Wilkinson, "The Incident of the Blood and Water in John 19:34," *Scottish Journal of Theology* 28 (1975): 159–60.

[5]For related discussions see Pierre Barbet, *A Doctor at Calvary: The Passion of Our Lord Jesus Christ as Described by a Surgeon* (Garden City, New York: Image Books, 1963), 139–42; Wilkinson, "The Incident of the Blood and Water in John 19:34," 159–64; and Frederick T. Zugibe, "Death by Crucifixion," *Canadian Society of Forensic Science Journal* 17 (1984): 4.

[6]Doron Zahger and Eliyahu Milgalter, "Clinical Problem Solving: A Broken Heart," *New England Journal of Medicine* 334 (1996): 319–21.

[7]David A. Ball, "The Crucifixion and Death of a Man Called Jesus," *Journal of the Mississippi State Medical Association* 30 (1989): 80–82.

[8]The interested reader is referred to several studies that describe this type of respiratory pattern in volunteers undergoing mock crucifixion: Hermann Moedder, "Die Todesursache bei der Kreuzigung," *Stimmer der Zeit* 144 (1948): 52–59; Frederick T. Zugibe, "Two Questions about Crucifixion," *Bible Review* 5 (April 1989): 36; Zugibe, "Death by Crucifixion," 7; and Ball, "Crucifixion and Death of a Man Called Jesus," 77–83. At first glance, the studies of Zugibe appear to contradict the hypothesized respiratory pattern seen during crucifixion. However, a careful review of his study reveals that his mock crucifixions were done such that the body was kept in a raised position throughout the study. Furthermore, whenever cramping or discomfort in the study subject occurred, Dr. Zugibe would support the weight of the body at the level of the thighs and allow the subject to rest. This maneuver would serve to prevent the development of the very phenomenon he was trying to study. The balance of evidence therefore supports the development of severe respiratory embarrassment during crucifixion.

Equally instructive are horrific eyewitness accounts of victims of torture during the first and second world wars. The Austro-German and Nazi armies used a practice known as *aufbinden* as a torture tehnique. The victim was suspended by the wrists such that the feet scarcely touched the ground. The chest wall was stretched by the body's weight such that the victim could not exhale without lifting the body up by the arms. If the victim was prevented from doing so, he or she would rapidly die of asphyxia. Barbet, *A Doctor at Calvary,* 75–76; and R. W. Hynek, *Science and the Holy Shroud* (Chicago: Benedictine, 1936).

For more on theories that support asphyxia as the cause of Christ's death, see Barbet, *A Doctor at Calvary,* 81–83; R. Bruce-Chwatt, "Death on the Cross," *World Medicine* 29 (1984): 17–19; Nicholas P. De Pasquale and George E. Burch, "Death by Crucifixion [letter]," *American Heart Journal* 66 (1963): 434–35; Charles D. Johnson, "Medical and Cardiological Aspects of the Passion and Crucifixion of Jesus, the Christ," *Bolletin Association Medicine Puerto Rico* 70 (1978): 101.

[9]C. Truman Davis, "The Crucifixion of Jesus: The Passion of Christ from a Medical Point of View," *Arizona Medicine* 22 (1965): 187; W. D. Edwards, W. J. Gabel, and F. E. Hosmer, "On the Physical Death of Jesus Christ," *Journal of the American Medical Association* 255 (1986): 1463; J. E. Holoubek and A. B. Holoubek, "Execution by Crucifixion: History, Methods and Cause of Death," *Journal of Medicine* 26 (1995): 11–15; A. A. Le Bec, "The Death of the Cross: A Physiological Study of the Passion of Our Lord Jesus Christ," *Catholic Medical Guardian* 3 (1925): 126–32; R. Lumpkin, "The Physical Suffering of Christ," *Journal of the Medical Association of the State of Alabama* 47 (1978): 8–10; S. M.

Tenney, "On Death by Crucifixion [letter]," *American Heart Journal* 68 (1964): 286–87; Zugibe, "Two Questions about Crucifixion," 40–41; Zugibe, "Death by Crucifixion," 11–13.

[10]Le Bec, "The Death of the Cross," 130–31; J. R. Whitaker, "The Physical Cause of the Death of Our Lord," *Catholic Medical Guardian* 13 (1935): 87–88.

[11]Hugh J. Schonfield, *The Passover Plot: New Light on the History of Jesus* (New York: Bantam, 1965); J. G. Bourne, "The Resurrection of Christ: A Remarkable Medical Theory," *[London] Sunday Times* (January 24, 1965); C. C. P. Clark, "What Was the Physical Cause of the Death of Jesus Christ?" *Medical Record* 38 (1890): 543; W. B. Primrose, "A Surgeon Looks at the Crucifixion," *Hibbart Journal* 47, no. 4 (1949): 382–88.

[12]For a review of the judicial irregularities associated with Christ's trials before the Jewish Sanhedrin, see R. Bucklin, "The Legal and Medical Aspects of the Trial and Death of Christ," *Medicine, Science and the Law* 10 (1970): 14–26.

[13]Margaret Lloyd Davies and Trevor A. Lloyd Davies, "Resurrection or Resuscitation?" *Journal of the Royal College of Physicians of London* 25 (April 1991): 167–70.

[14]See Schonfield, *The Passover Plot;* Bourne, "The Resurrection of Christ: A Remarkable Medical Theory"; Clark, "What Was the Physical Cause of the Death of Jesus Christ?" 543; Primrose, "A Surgeon Looks at the Crucifixion," 382–88.

[15]Lloyd Davies and Lloyd Davies, "Resurrection or Resuscitation?" 168.

[16]Alfred Edersheim, *The Life and Times of Jesus the Messiah* 2 vols. (New York, N. Y.: Longmans, Green, 1899), 2:614–15; Talmage, *Jesus the Christ,* 668–69.

[17]Death may be averted by applying cardiopulmonary resuscitation, or CPR, as a temporizing measure to mechanically force blood through the heart by compressing it between the sternum and spinal column. It is estimated that CPR may deliver approximately 10 percent of normal cardiac output, which may be enough to perfuse the brain for a short period of time. If coordinated cardiac activity can be restored through the timely administration of an electrical shock, normal pumping action may be restored in some instances.

[18]Zugibe, "Death by Crucifixion," 8–11.

[19]Latter-day prophets have indicated that the pains of Gethsemane and the horrors of the atonement returned to Christ in his final hours on the cross. See Talmage, *Jesus the Christ,* 660–61, and Bruce R. McConkie, *A New Witness for the Articles of Faith* (Salt Lake City: Deseret Book, 1985), 109.

[20]"More Holiness Give Me," in *Hymns of The Church of Jesus Christ of Latter-day Saints* (Salt Lake City: The Church of Jesus Christ of Latter-day Saints, 1985), no. 131.