The Journal of Collegium Aesculapium

FALL 2012

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Collegium Aesculapium addresses the ethical and spiritual as well as the physical aspects of medicine. Thus, we invite qualified professionals to embrace the Collegium and take advantage of insightful meetings and seminars, newsletters, service opportunities, and the *Journal of Collegium Aesculapium*, all of which include this important expanded dimension, as well as the constantly changing body of scientific information available to us.

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THE JOURNAL OF
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Manuscripts considered for publication in the *Journal of Collegium Aesculapium* must be clinically appropriate and spiritually consistent with the principles and doctrines of The Church of Jesus Christ of Latter-day Saints. All manuscripts must be clearly written and submitted in a double-spaced 12-point font in a Microsoft Word e-mail attachment. A manuscript that meets these standards is peer reviewed by several members of the editorial board and is evaluated with the reviews by the editorial staff. After suggested content adjustments are made, an article may be accepted, edited to our standards of style and readable writing, and published in the *Journal*.

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The Journal
of Collegium
Aesculapium

FALL 2012

Take Up Thy Bed *and* Walk

by Elder Jeffrey R. Holland

I AM HONORED TO ADDRESS SO MANY WHOM I LOVE AND admire laboring in a profession I once thought would be my own. All through high school, the first years of college and my mission I was planning to be a physician. But somewhere along the way I felt I was supposed to be a teacher. So tonight I get to live vicariously through you, and through my wonderful son-in-law who is not only a great husband and father but is also a talented surgeon. We are very happy to have Dr. Lee McCann and his wife, our daughter Mary Alice, with us tonight.

But part of my message tonight is that as a teacher I still get to do a little of what you do as a healer, and certainly you as healers have the chance to do what I do as a teacher. For both groups of us, the Savior is the example. Let me develop that idea a little as the backdrop to my message tonight.

We quickly and readily think of Christ as a teacher—the greatest teacher who ever lived or ever will live. But even as He taught, He was consciously doing something in addition to that, something that put teaching in perspective.

As His ministry began, Matthew says:

"And Jesus went about all Galilee, *teaching* in their synagogues, and *preaching* the gospel of the kingdom, and *healing* all manner of sickness and all manner of disease among the people."[1]

Now the teaching and the preaching we know and would expect. But I remember the first time I realized that from this earliest beginning, healing is mentioned as if it were a synonym for teaching and preaching. In fact, the passage being cited goes on to say more about the healing than the teaching.

"And his fame went throughout all Syria: and they brought unto him all sick people that were taken with divers diseases and torments, and those which were possessed with devils, and those which were lunatic, and those that had the palsy; and he healed them."[2]

What then follows is the masterful Sermon on the Mount, six and a half pages that would take six and a half years to teach properly, I suppose. But the moment that sermon is over, He comes down from the mountain and is healing again. In rapid succession He heals a leper, the centurion's servant, Peter's mother-in-law, then a group described only as "many that were possessed with devils." In short, it says, He "healed all that were sick."[3]

Driven to cross the Sea of Galilee by the crowds that now swarmed around Him, He cast devils out of two who were dwelling in the Gadarene tombs and then sailed back to "his own city,"[4] where He healed a man confined to bed with palsy, healed a woman with a twelve-year issue of blood and then raised the ruler's daughter from the dead—only, by the way, after dismissing the sideshow-seeking audience from the room.

Then He restored the sight of two blind men, followed by the casting out of a devil which had robbed a man of the ability to speak. That is a quick summary of the first five chapters in the New Testament devoted to Christ's ministry. Then this verse. See if it has an echo for you:

"And Jesus went about all the cities and villages, *teaching* in their synagogues, and *preaching* the gospel of the kingdom, and *healing* every sickness and every disease among the people."[5]

That is, of course, except for a few words, *exactly* the verse we read five chapters earlier. It is a second declaration of what His ministry consists of. And He needs help in this service.

"But when he saw the multitudes, he was moved with compassion on them, because they fainted, and were scattered abroad, as sheep having no shepherd.

"Then saith he unto his disciples, The harvest truly is plenteous, but the labourers are few;

"Pray ye therefore the Lord of the harvest, that he will send forth labourers into his harvest."[6]

With that He calls the Twelve and charges them with this directive: "Go ... and as ye go, preach, saying, The kingdom of heaven is at hand. *Heal the sick, cleanse the lepers, raise the dead, cast out devils:* freely ye have received, freely give."[7]

Now, after taking too much time to make this point, let me make it. We know the Savior to be the Master Teacher. He is that and more. And when He says the bulk of the harvest yet lies before us and that there are far too few laborers, we immediately think of missionaries and others who need to teach. But the call is clearly for a certain kind of teacher, a teacher who in the process heals. And tonight I say, a healer who teaches.

We know that Jesus' life was filled with the performance of many kinds of miracles, but in light of what I have just said it will not be surprising to learn that of all the miracles of Jesus recorded in the New Testament, three-fourths of them are healings of one kind or another. Over and over again His heart was drawn out to those who pled for health and wholeness. He who would become the great example of human suffering sought to ease the pains of others when *they* suffered. In His infinite mercy he regularly healed the blind and the deaf, the lame and the lifeless. We do not give the Savior whimsical names but He rightfully could be recognized as the Great Physician.

As two of my friends have observed, "Probably in no way short of the crucifixion itself was the Savor's compassion for people revealed more fully than in his miraculous healings."[8]

What scenes could be more tender than the pleading leper, a beseeching centurion, or desperate parent, each in the need of a healing miracle? These and so many more

repeatedly turned to Christ acknowledging the wonder of His touch even if they did not always recognize or respond to His divine mission. For many it was as simple as one man said of Jesus: "Whether He be a sinner or no, I know not: one thing I know, that, whereas I was blind, now I see."[9] When it came to His miracles, Jesus was beyond the reach of Pharisaical haggling. The evidence spoke for itself.

One such marvelous incident is recorded in the 5th chapter of John. It occurred at the time of the feast of the Jews, probably the Passover, and Jesus had come up to Jerusalem to celebrate this sacred occasion. It was the Sabbath and Jesus, probably on his way to the temple, passed by a pool called Bethesda, or literally "the House of Mercy."

Surrounding the pool was a great multitude of the blind, halt, and withered, all waiting for a chance to step into this legendary pool. The tradition of the time was that when the waters of Bethesda were troubled, it was the work of an angel, therefore the first to enter the water following that divine manifestation would be healed. John's account refers to one man, lame for 38 years, who had not the physical strength to match his faith. Day in and day out he came to the pool to be healed, but day in and day out he was not mobile enough to be able to enter the water first. On this day mentioned, Jesus noticed the man and "knew that he had been a long time in that case." Jesus stopped, looked at him and said, "Wilt thou be made whole?" The lame man, considering the 38 years of his condition, may well have thought that either a naïve or cruel question. But surely the loving look in the eye of the Stranger not only merited his respect but gave him hope. With honesty he kept looking into those eyes and said, "Sir, I have no man ... to put me in the pool." Said Jesus, "Rise, take up thy bed, and walk." In that instant the lame man was made whole.[10]

> Over and over again His heart was drawn out to those who pled for health and wholeness. He who would become the great example of human suffering sought to ease the pains of others when *they* suffered.

In 1882, one hundred and thirty years ago this year, a group of Copenhagen's principal Lutheran priests commissioned the great artist Carl Heinrich Bloch to create a painting of this scene which would become known around the world as "Healing the Sick at Bethesda" *(next page)*. For more than a century this monumental and striking painting remained in Copenhagen. Through a remarkable series of events, and after more than a month of negotiations and consideration, an agreement was reached for the sale of this painting to the Brigham Young University Museum of Art, a museum which had been Sister Holland's greatest desire to see constructed before the conclusion of our service at that school. It was our last project finished when we left the presidential post in 1989. That this remarkable piece has become the signature piece for the wonderful museum of art at BYU, is a joy to Elder and Sister Holland. It is also a reminder to all of us of both the artistic and religious heritage that has come down to Latter-day Saints over the centuries.

Now, with the insights of those who know art much better than I—including authors Don Staheli and Lloyd Newell, whose insights and language I have used so extensively—may I invite you to join me in the Jerusalem of 2,000 years ago to stand together at the pool of Bethesda. In this remarkable piece of art, Jesus has entered the vicinity of the sheep market where the community's principal supply of water was located. He stands with—and may I suggest becomes one with—the substantial structure of stone walls and massive supporting pillars. This is, after all, the Great Stone of Israel, who has come among the people. The marketplace seems transformed into a veritable temple for this period of His presence there. The sunlight streaming into the arena sheds light on the scene, while the Son of Man brings light to the halt and the lame, the wounded and the weary—which from time to time includes all of us.

In the painting the Savior faces the pool with His back to the interior of the structure and the milling crowd in it. Directly behind Him is a figure traditionally thought to be Peter. Whoever he is, he seems to be uneasy, a little apprehensive, striking something of a protective pose, at the very least attempting to keep the crowd from jostling

the Master and disrupting this moment of His ministry. It appears that Peter knows well the growing hostility toward Jesus and the increasing danger to His life that came with it. The two men looking over Peter's shoulder do not look like friendly fellows. Peter, who later would take off the ear of a potential assailant, seems ready to do battle here if necessary. In any case, he seems to be more intent on danger than on the human drama about to unfold. Perhaps he is used to miracles by now, or perhaps he, too, is yet to comprehend the grandeur of this Jesus who has asked him to leave his nets and become a Fisher of Men.

In the painting Christ is, by contrast, completely at ease, shows no sign of fear, and is paying virtually no attention to the bustling crowd. He is single-mindedly determined to do the divine work He came to do. As with everything He did He is fixed and focused. In every moment of His life He was "A man on a mission."

You will notice that the artist has placed additional figures to the right of the center pillar. One of them is standing with the help of a crutch. Those sitting near His feet as well as those behind Him do not look physically handicapped, but are in no way conscious of—or at least don't appear to care about—the work of the Master about to unfold. They are so near yet so far away. How often—and with how many—is that true in our day? When the redeeming power of the Gospel of Jesus Christ is being demonstrated, being offered, being declared, we are often so near yet so far. Little wonder that Christ lamented those who had *good* health if it meant that they had eyes but did not see and ears but did not hear.

Barely visible in the lower left corner of the painting is a sad, shuffling, deformed figure who *does* seem to be noticing what the Savior is doing. He is one of the few in this painting who is actually trying to be a witness of this wonderful miracle. But under the circumstances he probably can't make his way forward. Maybe he is reluctant to ask.

And here is a sad thought. Maybe this terribly deformed man, forced to move about by using his hands as feet, has had the spirit of faith drained out of him by his hardened

Carl Heinrich Bloch (1834-1890), "Christ Healing the Sick at Bethesda" *(See cover image credit for detail.)*

life of crawling and begging. Perhaps he was subjected to abuse, to disdain, or even worse, to the total disregard of those who walked about him and towered over him. Has he become calloused of soul as well as of skin? Has he become so doubtful of the kindness of others that he can no longer even believe in the divine manifestation and pure love being displayed before his very eyes? It hurts my heart to think that to this man this may have been just one more favor that would be withheld from him. In the painting it seems that he sees the healing power but does not pursue it. I can only hope that it is not because the jeers and bullying of passers-by have beaten such hope out of him.

I wish now to draw your attention to the second most conspicuous man in the picture; a man seated against the painting's central stone pillar. He is the man with the red cap. His red cap and especially his wary eyes draw us to him. Indeed his eyes are almost haunting. I have actually wondered if he is blind and only the sound—not the sight—of what is going on next to him causes his head to turn. In any case, his leg is wrapped suggesting some infirmity and he clearly has the premier spot for entering the pool in front of him quickly. His red cap would seem to be his one worldly possession. His robe is ill-fitting, and we note his wounded leg. What is there in his face that might tell us the health of his spirit? Does he look distrustful? Does he look resentful? Is there something cynical in his look? Or just fatigue? Or is he seeing at all? The tight grip the man holds around his legs suggests some firmness and strength. One wonders if he would "open up," or "loosen up" under the Savior's touch. Or will he "hold back" just as he holds his afflicted leg?

Aside from the Savior's resplendent white robe, the man's red cap is the most striking piece of clothing in the painting. The extension of Christ's healing arm takes our eye in a straight line not only to the lame man hidden under the make-shift tent but on to the man in the red cap. He clearly is of considerable interest to the artist. What is going on under that cap and behind those eyes? As reluctant as the man may seem, he *is* turned slightly toward the Savior. The glance of his eyes signifies an interest in the Savior's healing power. But notice that other than the turned head there is not a single indication of bodily response. The body, the arms, the legs are still exactly as they were—and exactly as they have undoubtedly been every other day—straight toward the pool. This is a man who at this point is not willing or able to see "the more excellent way"[11] so very near to him. Faith is in the old tradition (the law?). Nothing beyond the slight tilt of his head suggests that he recognizes a new way of healing.

There is something of the man in the red cap in all of us. Faith of some kind from somewhere turns us toward healing but old problems and old ways hold us back. We, too, often prefer the way it's always been done, rather than releasing those arms holding our legs so tightly and letting a flight of faith change our lives instantly. Maybe we and the man in the red cap are always betwixt and between—one foot in Babylon but with the feeling we really should move permanently to Zion. Perhaps we can leave the man in the red cap with the call of Elijah to the children of Israel: "How long halt ye between two opinions?"[12] Or Paul to Agrippa—"I would to God that thou ... were both almost and altogether such as I am [a disciple of Jesus Christ]."[13]

At the far right of the Bloch painting, we see what appears to be three generations approaching the pool—a mother, a child, and a grandmother. The mother's protective hand draws the child close to her side. The child is a little uncomfortable in this setting. The grandmother follows behind. She has yielded an earlier role in her life and is now content to drop back a little, to follow in support of the new generations. But notice she seems to be fixed on the figure of the granddaughter. *(All the grandmothers in the room know exactly what I am saying!)*

In this interesting threesome, the artist provides an intriguing image of some of the primary functions of a family—nurture, protection, support—and the daily routine of fixing meals and cleaning things. Not much has changed in 2,000 years. The mother is gathering the means—in this case the water—for these culinary and cleaning needs of the family, but even then she gives the child the tender caress of love and also offers the child a skirt to cling to for a secure connection to her mother's physical presence.

Grandmother is not overtly involved in caring for the child, but she offers an additional set of eyes to protect the child. On some days she may almost seem to be taken for granted in her secondary, supporting role—but not really. Were grandmother *not* in this picture, I can promise you both mother and child would be considerably less peaceful than they appear in this scene.

Although the mother in the painting appears oblivious to the presence of the Savior, the position which Bloch places her suggests that he recognizes the powerful role this woman—a mother—plays. If you let your eye follow the line drawn downward from the mother's upraised arm it will lead directly to the man on the crutch—and then past him to—again!—the lame man in the red hat. A similar line drawn on from the Savior's outstretched right arm will intersect with the line from the mother's arm right at the now infamous red cap. Perhaps the message of the artist is that righteous mothers are as Saviors in their own right. They bring a power of love and healing that is second only to that of the Master Himself. Things like cooking and cleaning and skirts to cling to really do matter. And surely their love and protection matter

The dark canopy yields to the Savior's touch... The dark is becoming light, the infirm is becoming strong, perhaps even sinfulness is giving way to faith and repentance.

when the nourishing hand of this mother, joined with the beckoning hand of the Lord, brings the healing element that can soften the difficult experiences of life and lead us to peace in this life and eternal joy in the life to come. Righteous mothers work in partnership with heaven in the process of giving mortal life. Their influence never ceases to bear the fruit of love, faith, and hope, all of which brings healing to the heart.

The true focal point of Carl Bloch's narrative painting is, of course, Christ Himself. Dressed in white and bathed in the most beautiful light, Christ is the grand, majestic central figure of the scene. He approaches the man who lies huddled in dark shadows beneath a heavy canopy, almost invisible from view. Jesus lifts the covering, and with that lifting, literally and symbolically "lifts" the lame man or at the very least the burdens which afflict him. The canopy may be a visual representation of the many maladies that afflict mankind. The dark canopy yields to the Savior's touch and at least part of the lame man's body receives the bright light of grace. It is interesting to note that it is the legs, the afflicted limbs in question, that receive the light first. The dark is becoming light, the infirm is becoming strong, perhaps even sinfulness is giving way to faith and repentance. It is something of a still photo extracted from a moving picture. The words of Paul to the Corinthians could describe the dynamics of this emerging scene, "Therefore if any man be in Christ, he is a new creature: old things are passed away; behold, all things are become new."[14] Bloch clearly emphasizes Christ as the true source of vitality, the more excellent way. Christ's figure is central, bright, active, and powerful as opposed to the darkness around Him, including Bethesda's waters. The stone pillars and the floors further emphasize the Living Christ, sturdy, strong, and reflecting the light of hope.

For the man with the infirmity, the makeshift canopy seems to have been his cover for a long time. Although it provides some shelter and comfort it also appears to be almost a man-made cave, a retreat—at least he is virtually hidden in this painting. The covering shields the man from light but perhaps it also shields him from further heartache and disappointment. Although we don't know the precise nature of his infirmity, we know that it is serious and chronic. For 38 years he has been afflicted. The loosely wrapped rags, the bare chest and the legs akimbo remind us of his vulnerability. A stake of sorts is in front of his bed of straw, perhaps once securing the edge of his canopy. A stake! What a symbol of his unmoving, immovable condition.

The man has come as close to the water as he could reasonably get, but like most of us, he needs help to go farther. He had faith enough to wait at the water's edge for who knows how many of those 38 years, but one wonders how many times he asked for assistance into the pool and didn't get it. Or how many times he was *almost* the first one into the water only to be disappointed—again!

We can't see much of the man himself in his dark world, but as the Savior lifts the canopy, the clarity of the original painting reveals that the man seems surprised, somewhere between shock and hopeful anticipation. The man drops a half-eaten slice of melon as the light of the Lord washes over him.

Whatever his recognition of Jesus or lack of it, this is the moment for which he has waited. His eyes reveal his heart. In the darkness of Bloch's masterful depiction, we see his eyes filled with importuning.

We join the man being healed and look earnestly to Jesus, dressed in such resplendent white. Our eyes cannot help but focus quickly on His outstretched hand. His right hand—the "covenant hand"—is upturned and extended in love and compassion. This is not the hand of condemnation or reprimand, but the gracious hand of invitation. The open hand seems to declare his words, "Rise, take up thy bed, and walk."

My friends, that same loving hand reaches out to us. That same compassionate voice assuredly invites us, "Come unto me, all ye that labour and are heavy laden, and I will give you rest. Take my yoke upon you, and

learn of me; for I am meek and lowly in heart: and ye shall find rest unto thy souls. For my yoke is easy and my burden is light."[15] Over and over again we read that the Lord's hand is stretched out still.[16] "And how merciful is our God unto us, ... and he stretches forth his hands ... all the day long."[17]

Those of you in this marvelous volunteer association are, by definition, engaged in some aspect of medical practice and health service. But on occasion you need healing as much as do your patients and clients. The Lord wants to help you as much as He wants to help them. He also knows that your sojourn through mortality will not be easy—that you, too, will suffer infirmities of body and spirit for which you need healing. He knows that your life can be filled with some measure of sorrow and heartache as well as those you strive to treat. He also knows what we need in order to develop the attributes of godliness. As the Apostle Paul said, "For our light affliction, which is but for a moment, worketh for us a far more exceeding and eternal weight of glory."[18]

Jesus' outstretched hand is always ready to lift and succor and heal. He came into the world to teach us, to love us, to save our bodies and souls. Thank you for assisting Him in relieving suffering, in repairing the physical, the emotional and the spiritual, in teaching—and demonstrating—the relationship between health, wholeness, and holiness.

With a poem I quoted not long ago in general conference I conclude our consideration of divine healing tonight. The image shifts slightly from physician to carpenter but the theme of repair and renewal is the same. I leave these verses with you in tribute to your remarkable gifts and talents, which you dedicate to the work of the Master, in blessing mankind with the healing arts.

In Nazareth, the narrow road,
That tires the feet and steals the breath,
Passes the place where once abode
The carpenter of Nazareth.

And up and down the dusty way,
The village folk would often wend;
And on the bench, beside him, lay
Their broken things for Him to mend.

The maiden with the doll she broke,
The woman with the broken chair,
The man with broken plow, or yoke,
Said, "Can you mend it, Carpenter?"

And each received the thing he sought,
In yoke or plough, or chair, or doll;
The broken things which each had brought
Returned again a perfect whole.

So, up the hill the long years through,
With heavy step and wistful eye,
The burdened souls their way pursue,
Uttering each this plaintive cry:

"O Carpenter of Nazareth,
This heart, that's broken past repair,
This life, that's shattered nigh to death,
Oh, can You mend them, Carpenter?"

And by His kind and ready hand,
His own sweet life is woven through
Our broken lives, until they stand
A New Creation—"all things new."

"The shattered idols of my heart,
Desire, ambition, hope, and faith,
Mould thou into the perfect part,
O, Carpenter of Nazareth."[19]

In the name of Him who can heal all broken things, even Jesus Christ, amen.

Elder Jeffrey R. Holland is a member of the Quorum of the Twelve Apostles of The Church of Jesus Christ of Latter-day Saints. This address was given to the Collegium on March 28, 2012 in Salt Lake City.

REFERENCES

*I am indebted to Dr. Donald Doty for suggesting the approach I might take in an address to those of a profession not my own. I am even more indebted to Brother Don H. Staheli who introduced me to his marvelous little book, "The Healer's Art," co-authored with Brother Lloyd D. Newell. I have drawn heavily and directly from Brother Staheli's and Newell's work, including their skillful discussion of Carl Bloch's artistic masterpiece.

1. Matt. 4:23; emphasis added.
2. Matt. 4:24.
3. Matt.8:16.
4. Matt. 9:1.
5. Matt. 9:35; emphasis added.
6. Matt. 9:36-38.
7. Matt. 10:6-8; emphasis added.
8. Staheli & Newell.
9. John 9:25.
10. See John 5:1-11.
11. 1 Cor. 12:31.
12. 1 Kings 18:21.
13. Acts 26:29.
14. 2 Cor. 5:17.
15. Matt. 11: 28-30.
16. Isaiah 5:25, 9:12, 17.
17. Jacob 6:4.
18. 2 Cor. 4:17.
19. George Blair, *Ensign* May 2006, p. 71.

PSA SCREENING
still saves lives

by *Anthony W. Middleton, Jr., M.D.*

The use of the PSA screening blood test for the detection of prostate carcinoma became widely available in the early 1990s, and its use became fairly standard worldwide in about 1992. Its use in recent years has been condemned by certain groups, and in October 2011 the U.S. Preventive Services Task Force made public its new recommendation:

> *"Routine PSA screening does more harm than good, and healthy men should no longer receive the test as part of routine cancer screening."*

The American Urological Association quickly responded to the USPSTF recommendation through one of its board members, Dr. Brant Thrasher, who is the Kansas University Cancer Center Chairman of Urology:

> *"It is our feeling that, when interpreted appropriately, the PSA test provides important information in the diagnosis, pre-treatment staging or risk assessment and monitoring of prostate cancer patients."*

Dr. William Catalona, chair of the Northwestern University Urology Department, and an expert in managing prostate carcinoma, had given the Ramon Guiteras Lecture at the American Urological Association annual meeting in May 2011 entitled "PSA Saves Lives." Using his observations and illustrations in part, the purpose of this paper is to demonstrate that the use of PSA screening has in fact saved thousands of lives which otherwise would have been lost.[1]

The Gravity of Prostate Carcinoma

The American Cancer Society estimated that prostate carcinoma would be newly diagnosed in 240,890 men in the United States in 2011 (29% of all newly diagnosed malignancies in men). That represents more than twice the number of the second-leading newly diagnosed male malignancy of lung and bronchus carcinoma (115,060 new cases, or 14%). In 2011, the ACS estimated that 33,720 men would die of prostate carcinoma in the U.S., or 11% of malignant deaths in men. *(Fig. 1)*

Approximately 1 man in 35 will die of prostate carcinoma. Arguably, every one of those prostate carcinoma deaths could have been prevented by timely early intervention. Screening currently provides the only practical method of early diagnosis, as prostate carcinoma typically has progressed beyond cure once symptoms develop.

In the state of Utah the ACS projected there would be 1,890 new cases of prostate carcinoma diagnosed in 2011, with 230 resultant deaths from the malignancy in 2011.

The ACS further notes that the probability of a U.S. male developing a significant prostate carcinoma during his lifetime is 16.22%, or 1 chance in 6. *(Fig. 1)*

Incidence of prostate carcinoma per 100,000 men is:

- United States 155.5
- Minnesota (highest) 184.6
- Utah (2nd highest) 182.2

The cause for the state-by-state variance is unknown, but is of great interest.

The Impact of Treatment

An important study comparing surgery (a radical prostatectomy) versus watchful waiting appeared in the New England Journal of Medicine, the May 5, 2011 edition. *(Fig. 2)* As noted, the group of men having surgery carried a 41% decreased likelihood of being found to have developed metastases over the course of the study when compared to the watchful waiting group, a 38% decreased likelihood of sustaining a prostate cancer-specific death, and the surgical group had a 25% decreased likelihood of death due to all causes. When the subset of men initially diagnosed under age 65 are examined, the figures are even more pronounced, with the surgical group having a 53% decreased likelihood of developing metastases, a 51% less likelihood of a prostate cancer-specific death, and a 48% decrease in death from all causes as compared with those diagnosed with prostate carcinoma and followed with watchful waiting. Even the subset of men initially diagnosed as having "low risk" disease were found to have an advantage with a radical prostatectomy of a 57% decrease in metastases, a 47% decrease in prostate cancer-specific death and a 47% decrease in all cause deaths when compared to the watchful waiting group. In this study, early intervention clearly saved lives.

Evidence from Randomized Screening

There is evidence from four randomized screening trials that PSA screening saves lives. The four are:

- European Randomized Study of Screening for Prostate Cancer (ERSCP)
- Prostate, Lung, Colorectal, Ovarian (PLCO)
- Norrköping Population-Based Randomized Screening Trial (Sweden)
- Göteborg Population-Based Randomized Screening Trial (Sweden)

ERSPC Study

This study produced the following conclusions:

- Men in the screening arm had 40% fewer advanced cases of prostate carcinoma at diagnosis, as compared to the non-screened arm.
- 20% lower prostate carcinoma specific death rate in the screening arm.
- The mortality benefit was observed largely in men aged 55-69.[2]

Of concern was the calculated number needed to treat (NNT), with the initial report estimating that 48 men had to be treated (NNT) to prevent 1 prostate cancer death. However, the study had only a 9-year median follow-up—too short when studying prostate carcinoma, which is a slowly progressive though lethal disease. *(Fig. 2)* This relatively high NNT of 48 was startling to the medical community and general public, but as noted later studies with a longer follow-up have a lower NNT. Also, the NNT is influenced by age and overall health of the men studied.

The PLCO Trial

The initial study, reported in the 2009 *NEJM* article, concluded, "…we now know that prostate-cancer screening provided no reduction in death rates at 7 years…"[3]

Several commentators summarized these two large screening trials as yielding credible but conflicting results. Their conclusion is challenged at its core by a closer analysis of the data by Dr. David Crawford, who considered the relative strengths and weaknesses of each trial and demonstrated a striking mortality benefit in the subset of men who had minimal or no co-morbidities. In his analysis of the PLCO data, he found that the subset of men found to have prostate carcinoma with minimal or no co-morbidity pre-existing had a 44% decrease in PCa-specific mortality, with an NNT of just 5, with a P=0.03.[4] *(Fig. 3)*

Norrköping (Sweden) Screening Trial

This trial was publicized as being a "negative" screening trial, spawning such reports as the April 1, 2011 BBC World News report headlined "Screening for Prostate Cancer Doesn't Save Lives (British Medical Journal)." The report quoted Dr. Anne Mackie of the U.K. National Screening Committee, who had stated, "At the moment the potential harms significantly outweigh the benefits of screening."[5]

The Norrköping Trial had followed 9,026 men who were in their 50s or 60s in 1987 at the start of the trial. It has significant limitations, as noted below:

1. It is small, with only 85 screen-detected prostate carcinoma cases found.
2. The men were screened only every 3 years—the first 2 screens consisted of a digital rectal exam (DRE) only; there was no PSA screening until years 6 and 9.

3. It used only fine-needle aspiration cytology for diagnosis instead of the far more accurate core needle biopsy.
4. The median age at diagnosis was 68 and 70 years in the two arms of the study, an older age at which considerable co-morbidities are found.
5. The median follow-up was only 6 years.

Other somewhat glaring problems are noted in Fig. 4, which compares the screening and no screening arms of the trial side-by-side. Problematically, 49% of the screen-detected men were assigned to a watchful waiting arm and only 33% of the screen-detected prostate carcinomas were treated with a radical prostatectomy, making the analysis and conclusions suspect. Another stunning finding was that 74% of the men in the no screening arm had advanced prostate carcinoma once diagnosed, as opposed to just 43% in the screening arm.

Other analyses of the Norrköping data support an important role in screening, unlike the Dr. Anne Mackie conclusion reported by the BBC. For example, a Kaplan-Meier curve of the Norrköping data demonstrates a strong trend towards better prostate cancer-specific survival in those men who were screened. In addition, the risk ratio for prostate carcinoma death was significantly reduced in the screening arm of the Norrköping trial.

Göteborg (Sweden) Screening Trial

A population-based trial of 20,000 men aged 50-64, this trial is arguably the best. Features of this trial making its findings important are:

- The contamination rate (screening of controls) is only 3% when the study started, as opposed to about 15% in the ERSPC trial, and about 40% in the PLCO trial
- The subjects were screened every 2 years
- The trial used progressively lower PSA cutoffs over time:
  - 3.4 ng/ml in 1995-98
  - 2.9 ng/ml in 1999-03
  - 2.5 ng/ml 2004-end
- 93% complied with a request for a biopsy, compared to just 40% who did so in the PLCO trial
- 77% had a follow-up of 14 years

The results of the trial were impressive:

- There was a 41% decrease in advanced (and incurable) disease in the screening arm, with a greater than 66% decrease in advanced disease in the group of men who were actually screened according to the protocol

FIG 1: PROSTATE CANCER INCIDENCE 2011

	NEW CASES	PROJECTED DEATHS
United States	240,890 (29% of male cancers)	33,720 (11% of male cancer deaths)
Utah	1,890	230

Probability of a U.S. male developing prostate cancer during his lifetime is 16.22%.

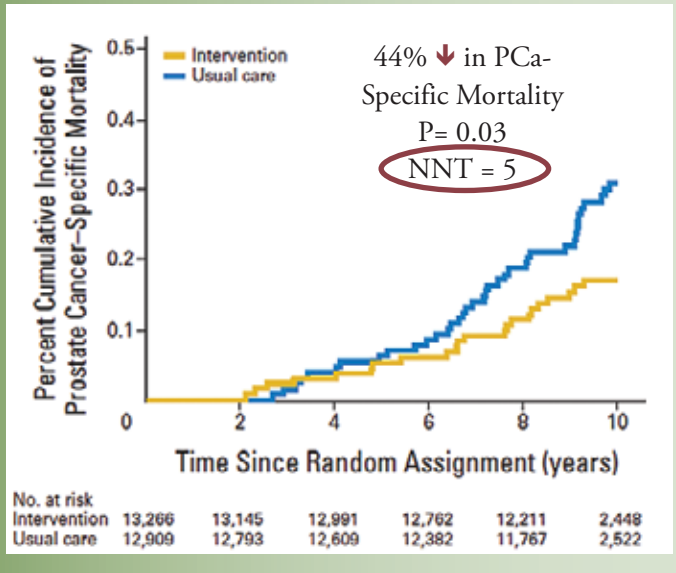
Source: Cancer Facts and Figures 2011, American Cancer Society, pg. 10

FIG 2: SURGERY DECREASES PC-SPECIFIC MORTALITY

SURGERY VS. WATCHFUL WAITING	METASTASIS	PROSTATE CANCER DEATH	ALL CAUSES DEATH
All	41% ↓	38% ↓	25% ↓
< Age 65	53% ↓	51% ↓	48% ↓
Low Risk	57% ↓	47% ↓	47% ↓

Source: NEJM 364;18

FIG 3: PROSTATE CANCER-SPECIFIC MORTALITY WITH MINIMAL OR NO CO-MORBIDITY IN PLCO TRIAL



Source: Crawford ED et al. J Clin Oncol *29:355, 2010*

- There was a 44% decrease in prostate carcinoma (PCa) mortality in the screening arm, which dropped even lower to a 56% decrease in the men who were actually screened
- The number needed to treat (NNT) to save one life at 14 years follow-up was 12, which compares very favorably with well-established screening programs for breast cancer (NNT @ 10 years for breast cancer is 10)
- As yet, there is no difference in the overall survival in the screened arm, but that always takes longer to demonstrate[6]

Epidemiologic Evidence that PSA Screening Saves Lives

The U.S. SEER database (Surveillance Epidemiology and End Results) is useful to the understanding of PSA screening. Its data demonstrates:

- A 75% decrease in metastatic disease at the time of prostate carcinoma diagnosis
- A 40% decrease in the age-adjusted prostate cancer mortality rate (from 39.2/100,000 men in 1992 down to 23.5/100,000 men in 2007)

Overall, SEER observations show a falling PCa death rates during the PSA era. A striking 17,000 fewer men died of prostate cancer in 2007 than in 1992, the beginning of the PSA era.[7]

Death Rate Projections in Prostate Cancer Mortality, If PSA Screening was Not Available

If the age-adjusted prostate cancer mortality rate had remained at 39/100,000 men, as it was in 1990, and taking into account the increased U.S. male population from 122 million in 1990 to 151 million men in 2007, there would have been 59,000 prostate cancer deaths in 2007. Instead, 35,000 men died in 2007 of prostate cancer, a decline of 24,000 fewer deaths than would be predicted. (To appreciate the life-savings of this number, consider that it is more than the full capacity of the BYU Marriott Center.) The widespread use of PSA screening arguably is the single most important factor in this decreasing death rate.

To assess whether PSA screening deserves the credit for the decreased PCa mortality, two mathematical modeling studies, funded by the U.S. National Cancer Institute's Cancer Modeling Network, have been reported. Each projected the prostate cancer mortality in the absence and presence of PSA screening. The University of Michigan study found a 70% mortality benefit due PSA screening, while the Fred Hutchinson Cancer Research Center estimated a 45% mortality benefit.[8]

FIG 4: TREATMENT & TUMOR STAGE

TREATMENT	NO SCREENING(%)	SCREEN DETECTED (%)
Watchful waiting	35	49
Radical prostatectomy	8	33
Hormonal therapy	50	9
Brachytherapy	1	0
External radiotherapy	5	9
TUMOR STAGE		
Localized	27	57
Advanced	74	43

Source: BMJ 2011;342:d1539

Global Evidence that PSA Screening Saves Lives

The World Health Organization tracks the prostate cancer mortality rate country by country worldwide. Those countries in which PSA screening is being used demonstrate a falling prostate cancer death rate similar to that noted in the U.S. Those countries in which PSA screening has not been used, to the contrary, show a steadily increasing prostate cancer death rate, which again validates the idea that PSA screening saves lives.[9]

The five Nordic countries give another example of the importance of PSA screening. Iceland, Norway, Finland, and Sweden introduced PSA screening in the early 1990s, while Denmark did not until five years later. The mortality rates from prostate cancer stabilized or declined in the four countries which began PSA testing, but they continued to rise in Denmark until it too began PSA testing five years later.[10]

Tyrol, Austria PSA Experience

In one province in Austria, Tyrol, PSA testing for the male population was made available at no cost, and the availability was advertised, starting in 1993. Many men were tested, and definitive therapy was offered and administered when prostate carcinoma was found. Over the next several years it was found that the prostate carcinoma mortality rate for Tyrol fell by 54%, whereas the decreased mortality rate in the rest of Austria, where PSA was offered at a cost, and was not advertised to the same extent as in Tyrol, the mortality rate fell by just 29% (p=0.006).[11] Again, PSA screening saved lives.

Northern Ireland Experience

A comparison of men in Northern Ireland, where only about 6% of men had PSA screening as opposed to the

screening arm of the ERSPC European study, where 94% of men were screened, reveals again a stark difference in the mortality rate from prostate carcinoma, with a 37% decrease in the PC mortality rate in the ERSPC study when compared to men in Northern Ireland. Additionally it was found that ERSPC study men had a 53% lower rate of metastases at the time of diagnosis than was true in Northern Ireland.[12]

Does PSA Screening Cause Significant Overdiagnosis?

Dr. Draisma recently used a model configured with his PCa data from Rotterdam, and concluded that prostate carcinoma was 66% overdiagnosed.

However, two other excellent statistical studies have estimated the likelihood of over-diagnosis, both studies part of the NCI Modeling Network. One was a study from the University of Michigan looking at the SEER epidemiologic data, which estimated a statistical chance of a 28% overdiagnosis, while a similar study done at the Fred Hutchinson Cancer Research Center estimated a possibility of a 23% overdiagnosis.[13]

Surgical Pathology Demonstrates More Underdiagnosis than Overdiagnosis

Two papers have examined the pathological reports after radical prostatectomies to compare the pre-operative staging with the more accurate post-surgical pathologic staging. Graif et al. found just 7% of cases were overdiagnosed pre-operatively, while 25-30% were underdiagnosed.[14] Pelzer et al. reported similar results, with 20% overdiagnosed pre-operatively, with 18-30% underdiagnosed.[15]

Media Bias Against PSA Screening Discourages Men from Obtaining Needed Screening

The media blitz of anti-PSA screening articles and newscasts is clearly designed to discourage men from obtaining PSA screening. As this paper has shown, appropriate PSA screening does in fact save lives, and in my opinion opponents of screening who suggest that men should not seek an early diagnosis of prostate cancer, when it is curable, do a disservice to the public. Screening clearly is necessary to give prostate cancer patients all treatment options at the earliest possible time. As some of the studies cited demonstrate, not all newly diagnosed prostate cancers require aggressive treatment to save lives. (In the Göteborg study, 28% of the screening group were managed with surveillance, yet overall screening achieved a 44% lower mortality rate.)[16]

Current Guidelines and Summary

While the U.S. Preventive Services Task Force has recommended "healthy men should no longer receive the test as part of routine cancer screening," the strong evidence from multiple sources and studies presented in our paper makes clear that PSA screening does in fact save lives. The current guidelines supported by the American Urological Association and the American Cancer Society are:

For men with a 10-year or more life expectancy:

1. An informed discussion of the risks and benefits of PSA screening should be given the patient.

2. A baseline PSA and Digital Rectal Examination (DRE) should be made at age 40 to assess risk.

* If the risk is high (positive family history of PCa, African-American race, baseline PSA over 1, or a PSA velocity of over 0.35 per year), annual screening is indicated.

* If the risk is average, screen again at age 45 and then annually beginning at age 50

To lower the prostate cancer mortality rate still further, we need to better educate physicians, especially primary care physicians, and patients that PSA screening performed wisely will save lives—perhaps their own life!

PSA screening, properly applied, saves lives.

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Pornography and the BRAIN

It is an honor to address you in the context of an organization of LDS physicians. We have a unique opportunity to understand the body both from the vantage point of our education as medical professionals and through our understanding as members of The Church of Jesus Christ of Latter-day Saints.

I am grateful, in addition to discussing the secular science we will cover this morning, to have the opportunity to share personal insights regarding the Savior, the Great Healer. We are involved in a culture war for the hearts and minds, literally, of men and women. The war started before we came to this earth, for we learn in Revelation that "there was war in heaven."[1] The war has not ended; rather, it has intensified, "for he (meaning the adversary) maketh war with the saints of God, and encompasseth them round about."[2] His goal, then and now, was and is to "destroy the agency of man, which I, the Lord, had given him,"[3] and pornography is perhaps his most effective tool today in accomplishing this goal. Once limited by addiction, agency must be re-gifted through the grace of the Atonement of Jesus Christ through the process of repentance and recovery. Today I would like to arm you with insights about pornography addiction in a world which worships and protects it. You will see this apologism in the words of the pornography industry, and in much of academic psychology, where the god of sexual libertinism is worshipped. They wish to dumb it down into something less than addiction, perhaps a "problem for some," but not a brain changing addiction. So let's consider the science.

There are currently no prospective peer-reviewed studies on pornography or sexual addiction, for that matter, in the context of neuroscience. Truly unbiased research on human sexuality is probably not possible in today's cultural environment. Activism has ensured that any true research regarding unrestricted sexuality will take place in a scientific vacuum.

The pornography industry, and some academic psychologists who share their views, are of the following opinion, as voiced by a representative of the pornography industry:

> While much has been written and said about pornography being addictive, on par with drugs, booze and cigarettes, it's important to consider that this misinformation has been based upon questionable "science" and the opinions of anti-porn activists—not upon any legitimate, unbiased research. Consider also the fact that "drugs, booze and cigarettes" are all physical, chemical agents that are ingested and can indeed have measurable, harmful, addictive effects. The mere viewing of any type of subject matter hardly falls into this category and, in fact, belittles the very real battles that addicts face over drugs, booze and cigarettes—all of which can be lethal. No one ever died from looking at porn. While some compulsive types can be "addicted" to anything, such as watching a favorite television show, eating ice cream or going to the gym, nobody suggests that ice cream is akin to crack cocaine and should be regulated to protect…people from themselves—instead, these compulsive actions are rightfully viewed by society as personality defects in the individual…[4]

An example of this same perspective manifest as academic apologism with regard to human sexuality is seen in a recent article in *Salon*, the San Francisco-based internet magazine. The author of the article trumpets a succession of psychologists who support some variant of

Understanding the ADDICTION

DONALD L. HILTON JR., MD, FACS

the same statement, "There is no specific study on pornography showing any effects on the brain." For instance, one said, "Not even a smidgen of such evidence exists..."[5]

Understand that by "evidence" they mean a prospective double-blinded control where, as one *Salon* article source said, we would have to take two groups of children and expose one to porn and protect the other to prove causation. Obviously this won't happen given the ethical issues with such a study. Yet I would presume that these same psychologists would accept the premise that tobacco is addictive without demanding the same prospective, child-based study. In other words, where is the comparative prospective study with tobacco in children? The one that divides the kids, gives half cigarettes, protects the others, and follows them? It doesn't exist, of course, and never will, and therefore those so biased will still say that smoking is not addictive, even now. So said the seven tobacco executives in front of Henry Waxman's Subcommittee on Health and the Environment. In succession, each said "No" when asked if smoking was addictive.

Yet based on a tapestry of research over the decades everyone but these tobacco executives believes evidence exists that tobacco is indeed addictive.

Is there evidence supporting the existence of pornography addiction? It depends on what one accepts, or can understand, as evidence, and this is a function of perspective and education. Perspective can introduce bias, and our perspectives are certainly multifaceted with regard to our attitudes. What may be meaningless to one may be definitive proof to another depending on differences in knowledge esoteric to the field in question. As T. S. Eliot said, "Where is the wisdom we have lost in knowledge? Where is the knowledge we have lost in information?"[6] Given the current cultural climate with regard to sex, don't hold your breath waiting for studies to come out showing that sexual activity should be restricted. In fact, Marnia Robinson, a Yale law grad, pointed out a blatant example of confirmation bias in one of the *Salon* psychologists where he said in a different interview, "We have the best MRI scanners in the world and I can promise you if we scan (a pornography user's) brain, we won't see any structural differences."[7] Internet porn is the new drug, and as we found with alcohol, "prohibition" will not be tolerated by the fawning masses.

Yet it is my opinion, based on current addiction neuroscience, and the opinion of the American Society of Addiction Medicine (ASAM), that these individuals are either biased or uninformed, that there is overwhelming evidence that natural addictions exist, and that sexual addiction is real. Let us consider some of this evidence.

In 2001 Howard Shaffer, head of addiction research at Harvard said in the journal *Science*, "I had great difficulty with my own colleagues when I suggested that a lot of addiction is the result of experience ... repetitive, high-emotion, high-frequency experience. But it's become clear that neuroadaptation—that is, changes in neural circuitry that help perpetuate the behavior—occurs even in the absence of drug-taking."[8] As Steven Grant at the National Institute for Drug Abuse (NIDA) said, "What is coming up fast as being the central core issue….is continued engagement in self-destructive behavior despite adverse consequence."[9]

In 2005 Dr. Eric Nestler, head of neuroscience at Mount Sinai and one of the world's most respected addiction neurophysiologists, published a landmark paper in *Nature Neuroscience* titled "Is there a common pathway for addiction?" In the paper he wrote: "Growing evidence

indicates that the VTA-NAc pathway and the other limbic regions cited above similarly mediate, at least in part, the acute positive emotional effects of natural rewards, such as food, sex and social interactions. These same regions have also been implicated in the so-called 'natural addictions' (that is, compulsive consumption of natural rewards) such as pathological overeating, pathological gambling and sexual addictions."[10]

In August of 2011, ASAM released its new definition of addiction. Comprised of medical doctors, it is the organization representing the specialty of addiction medicine. Four years in the making and involving over 80 addiction experts, it made two clear and unequivocal statements. The first is that addiction is a chronic disease of the brain, affecting the reward, motivation, and memory systems. Second, addiction includes compulsive destructive behaviors involving sexuality, gambling, and overeating as much as substances such as cocaine and opioids. In other words, it's not about the behavior or substance, it's about the brain. With this definition it would seem the debate about whether or not sex can be an addiction would be over. To the medical specialty of addiction medicine, comprised of medical doctors who have an understanding and appreciation for neurobiology and neuroscience, it is over, in the affirmative. Consider the following statement, for instance, from the definition:

"Addiction also affects neurotransmission and interactions between [memory] circuits and brain reward structures, such that the memory of previous exposures to rewards (such as food, sex, alcohol and other drugs) leads to a biological and behavioral response to external cues, in turn triggering craving and/or engagement in addictive behaviors."[12]

As we have reviewed some of the science behind addiction, you can understand why Dr. Michael Miller, representing ASAM, would make this statement: "At its core, addiction isn't just a social problem, or a moral problem, or a criminal problem. It's a brain problem whose behaviors manifest in all these other areas... It's about underlying neurology, not outward actions."[12] This understanding is important for many reasons. Take the concept of cross-sensitization, for instance, which is an understanding that addiction to one drug or behavior can sensitize an individual to addiction to another drug or behavior based on a common reward pathway change from any addiction. In 2001 Bradley and Meisel showed that sexual behavior sensitizes animals to amphetamine,[13] and in 2003 Awena and Hoebel showed that sugar dependence sensitized animals to amphetamines as well.[14] Dr. Eric Nestler cited cross-sensitization between drug addiction and natural addictions as one of the important evidences of the existence of these addictions.[15] Cross-sensitization has a very important clinical implication that

> It's become clear that neuroadaptation —that is, changes in neural circuitry that help perpetuate the behavior— occurs even in the absence of drug-taking.

therapists who don't understand the neurologic aspects of how drug and natural addictions are intertwined may not appreciate. ASAM's Frequently Asked Questions page regarding its definition is important in explaining to the lay public why cross-sensitization matters: "We all have the brain reward circuitry that makes food and sex rewarding. In fact, this is a survival mechanism. In a healthy brain, these rewards have feedback mechanisms for satiety or 'enough.' In someone with addiction, the circuitry becomes dysfunctional such that the message to the individual becomes 'more', which leads to the pathological pursuit of rewards and/or relief through the use of substances and behaviors. So, anyone who has an addiction is vulnerable to food and sex addiction."[16]

Thus, mental health professionals who understand that food and sex addiction are real with regard to the brain in terms of neuroplasticity will be better able to serve their patients. While many understand these concepts, some feel threatened by what they might consider incursion by biologists onto their professional turf. This may be partly illustrated by the confusion inherent in the ASAM/DSM perspectives.

The American Psychiatric Association (APA) has been resistant to the addiction label for natural addictions. They produce the Diagnostic and Statistical Manual of Mental Disorders (DSM) manuals, which Congress has mandated are used to define mental illness for insurance payment purposes and are used to define mental illness by healthcare professionals. Since it is based on behavior rather than neurobiology, addictions are characterized separately based on the unique behavioral characteristics of each addiction, rather than seeing all addiction as a behavioral consequence of altered brain reward, motivation, and memory systems.

The problem is that the DSM is being made into something it was never intended to be, a definition of the biologic basis for addiction! Since 1980, for instance, the DSM has stated that its definitions of mental illness are "atheoretical;" in other words, based on behavior as defined by observation and interview. The DSM has never

claimed to be a textbook on the neuroscience of mental illness, so the current debate on whether to define obesity, sex, and gambling as addictive or merely compulsive is a behavioral debate, not one based on neurobiology. That some on the board formulating the pending DSM V might consider including obesity and gambling as addictive but not sex illustrates this "behavior rather than biology" conundrum. To call pathologic expression of sexuality "hypersexual syndrome" but not an actual addiction, yet to allow the addiction label to be applied to obesity and gambling, is biologically inconsistent. The bottom line is the addiction label is no longer solely the APA's and DSM's call; it now belongs to ASAM and neuroscience. If I have a patient with a Grade IV astrocytoma who develops a severe depression, I will send him or her to a mental health professional for treatment, but I don't expect that professional to understand the cause of the tumor or the nuances of combining surgery and radiation to treat it. It is not within the scope of the DSM to define the neurobiologic basis of either astrocytomas or addictions; its focus is in the analysis and diagnosis, and treatment of the behavior. This controversy is one of perspective.

That many psychiatrists are embracing the addiction label with regard to sexual addiction is clear. For instance, Drs. Bostwick and Bucci at the Mayo Clinic recently published a paper describing treatment of Internet sex addiction with naltrexone, an opioid receptor antagonist. They summarized:

> In summary, cellular adaptations in the addict's PFC result in increased salience of drug-associated stimuli, decreased salience of non-drug stimuli, and decreased interest in pursuing goal-directed activities central to survival. In addition to naltrexone's approval from the Food and Drug Administration for treating alcoholism, several published case reports have demonstrated its potential for treating pathologic gambling, self-injury, kleptomania, and compulsive sexual behavior. We believe this is the first description of its use to combat Internet sexual addiction.[17]

Dr. Nora Volkow is head of the National Institute on Drug Abuse (NIDA), and is one of the most published and respected addiction scientists in the world. She has recognized the change in the understanding of natural addiction in advocating changing the name of the NIDA to the National Institute on Diseases of Addiction, as quoted in the journal *Science*: "NIDA director Nora Volkow also felt that her institute's name should encompass addictions such as pornography, gambling, and food, says NIDA adviser Glen Hanson. 'She would like to send the message that [we should] look at the whole field.'"[18]

Why would ASAM come out so forcefully with their unequivocal definition equating natural addictions such as those involving sex and food with drug addiction? Why would Dr. Nestler, Dr. Volkow, and Dr. Bostwick use the term addiction with regard to natural addictions including pornography and sexual addiction? These are medical doctors with expertise in the field of addiction who do not use the term lightly. What evidence would convince the 80 experts crafting the ASAM definition that natural addictions such as sexual addictions can be labeled a brain disease? How is this possible without specific studies of each behavior? The answer is that we must first ask the right question, which is, do natural addictions exist? If so, pornography addiction is exhibit number one. To understand the answer, it is necessary to have some perspective of the reward systems, and how they change in addiction.

In and at the head of the body, functionally and literally, is the brain. It is an intricate tapestry of 100 billion nerve cells, with at least another 100 billion or more supporting glial cells. Interestingly by comparison the Milky Way Galaxy is estimated to contain a comparable number of from 200 to 400 billion stars, with our sun being only a modest representative! When we consider the vast distances between individual stars in our galaxy it is difficult for us to understand any commonality of purpose. Yet when we look at our sister Andromeda galaxy we see the disc shape spiral, the rotation, the cohesion. What holds it together? Is it the unseen dark matter, the multimillion solar mass black hole at the center, or some yet unimagined entity or force known only to God?

We understand that our spirit inhabits our body as a temple, and that somehow our immortal spirit manifests its will into the temporal world through this neural galaxy we call the brain. I remember feeling this acutely a decade ago when a fellow physician called and asked if he could bring a CT of the brain by for me to review. It was his own brain. His group had purchased a new CT scanner, and he volunteered as the guinea pig to be the first to try it out. It showed, and an MRI confirmed, that he had a colloid cyst in his third ventricle, and it was already partially obstructing one of his lateral ventricles. I asked if he had a headache, and he said, "You know, I have had increasing headaches lately." He begged me to let him fly out of town for the upcoming Final Four, to which he had tickets and at which his favorite team, Texas, was a participant. I described, in calculated detail, how colloid cyst could cause sudden death, and instead he was in surgery the next day where I removed the cyst. It required an interhemispheric approach, splitting corpus callosum and entering the lateral ventricle. After removing the cyst I could see the striatum, and by looking through the Foramen of Monroe could see into the third and visualize the hypothalamus. Because I know this person as a fellow

physician, I experienced an epiphany of sorts. I realized that in these limbic structures his personality, his wants, desires, fears, and memory were embedded. Through these delicate and beautiful neural instruments his spirit was able to interface with the world. And I paused for a short moment of insight into who he was and who I am.

The Lord revealed to the Prophet Joseph Smith the simple but insightful concept, "And the spirit and body are the soul of man."[19] To understand addiction and to assist those who struggle, it is necessary to understand this truth. Let us take a moment and review some basic concepts of neuroanatomy and neurophysiology, then consider addiction in the context of revealed truth combined with our unique professional understanding.

The exterior of our brain is covered by a carpet of neurons from our eyes to our occiput, the cerebral cortex. It is in the cortex that we see, think, judge, feel, move, taste, and live. Some areas of the cortex are strictly functional; if we are awake and see something, light reflecting off of the image strikes our retina and is carried to the occipital cortex where it is processed involuntarily as a photographic reproduction of the image carried by the light. Sounds are recorded and sent by the inner ear to the auditory cortex where the noise is processed, and motor strip neurons initiate an electrical chain stimulating muscle cells to contract. Other cortical regions such as Weinike's turn meaningless sounds into words and speech, and Broca's cortex turn ideas and emotions into words. The cortex absorbs and processes information, but the limbic regions allow emotion and meaning to bring perspective to the information. For instance, the hippocampus is important in technical memory, while the amygdala records and processes emotional memory; it colors the black and white information with emotional Technicolor. We may see the image of our wife's face, but it would be meaningless without the emotional context provided by the limbic system.

Inherent in this limbic circuit are powerful reward pathways which motivate us to eat, to reproduce, to win. At the center of this system is the nucleus accumbens, with all roads leading to this Rome of the brain reward world. The neuronal cell bodies in the nucleus accumbens are coated with receptors to a variety of neurotransmitters, from glutamate and opioids to cannabinoids. Preeminent in this neurochemical potpourri are the dopamine receptors, ready to receive dopamine from across the synapse from dopaminergic pre-synaptic terminals at the end of axons originating in the ventral tegmental area of the midbrain, the dopamine pharmaceutical lab of the brain. We even call these pathways the dopaminergic reward systems in acknowledging this central role.

Dopamine is an excitatory catecholamine, differing only slightly from its close cousins epinepherine and norephinepherine. It is produced in the midbrain, in the ventral tegmental area (VTA). It powers the brain with desire, with motivation to do, to get, to receive the promised reward. It is important in our focusing on what we want, what we desire, rather than the resolution part of the reward, which is more the purpose of the natural opioids. These opioids provide the satiation, the eupohoria of enjoying the reward. Dopamine focuses our attention of whatever reward we have taught our brain we most want with laser-guided intensity. This is good when we allow our frontal cortex to balance pleasure with judgment. Dopamine wants! Opioids like! They work in tandem, in a symphony of desire and reward, of craving and satiation. The memory of past rewards causes us to desire to experience the rewards again, and we boundary this desire with frontal control. The amygdala is the repository of these deep limbic memories, and it communicates with our frontal areas in providing meaning to the dopaminergic desire coming out of the VTA and to the satiation provided by opioids. The amygdala colors our pleasure with meaning, with purpose.

Our neocortex also projects to these limbic regions; it floods the nucleus accumbens and the dorsal striatum with glutamate, another excitatory neurotransmitter. These inputs carry different points of view, however. The orbitofrontal cortex (OFC) and dorsal anterior cingulate gyrus (dACG) both receive dopamine from the VTA also, and they appraise and judge the stimulus as they turn dopaminergic desire into a plan of action. Don't just want it, do it! The OFC seems to be more important in stimulus selection. I want that one! It is the microscope that helps focus, with memory from the amygdala, on a particular craving, a specific addiction, while the dACG helps with the plan of action.

Our OFC, ACG and associated frontal control centers ride above, physically and functionally, on the wild horse of the amygdala, the VTA, the NA, and the other desire-driving limbic regions. These frontal regions provide a bridle, a brake, to keep this horse in check.

When we allow the limbic horse to run unbridled, several things occur which cause physical and neurochemical changes in the brain, and a state of addiction ensues. First, overutilization of the dopaminergic pathways facilitates a downgrading of the system, which resets the hedonistic set point. This creates a new normal, a 'dopamine dearth' of sorts, which motivates the individual to act out in addiction to return to homeostasis. Of course, addiction is anything but homeostasis, and repeated binges simply worsen the imbalance. The downgrading occurs in the nucleus accumbens, where less dopamine is produced by progressively atretic VTA cells, and there is less dopamine available in the pre-synaptic

When we allow the limbic horse to run unbridled, several things occur which cause physical and neurochemical changes in the brain, and a state of addiction ensues.

vesicles as well. There is also a downgrading of receptors on the post synaptic terminals of the medium spiny neurons in the NA. We see this downgrading when we label dopamine receptor antagonists such as raclopride, and we can see decreased metabolism in reward structures in response to a stimulus challenge in both drug and in natural addiction as well.

Decreased receptors have been seen not only in drug addiction, but also in obesity. Decreases in metabolic function have been seen in drug addictions and in both food[20] and gambling.[21] That these changes are causative is clear. For instance, we see recovery of dopaminergic receptor function with weight loss after gastric banding surgery.[22]

Second, these metabolic changes are seen both chemically and micro-structurally. Consider DeltaFosB, a protein found a decade ago to be chronically elevated specifically in the medium spiny neurons of the nucleus accumbens in the brains of drug addicted laboratory animals. Studies have shown it to be elevated in these same cells in animals manifesting pathologic over-consumptions of natural rewards such as food and sex.[23] It now appears that ΔFosB is a molecular switch which may be important in turning on other gene sets which produce mediators of neuroplastic change in these neurons; in other words they promote neural learning. We use the term neuroplasticity to denote physical changes that occur in neurons with learning. Addiction, as Malenka and Kaeur said speaking in the context of neuronal change, is "a pathologic but powerful form of learning and memory." Addiction is learning on a neuronal basis to crave rewards that not only don't enhance survival, but are harmful. Pornography viewing is an exercise in neuronal plasticity and learning, with the frantic searching and evaluating each clip of video for the promise of maximal sexual reward. If online gambling is accepted as an addiction by psychologists, internet pornography is online poker on steroids. Supraphysiologic levels of ΔFosB appear to portend addiction, as described by Dr. Eric Nestler in his Royal Society paper on the role of ΔFosB in both drug and natural addiction: "The nucleus accumbens is believed to function normally by regulating responses to natural rewards, such as food, drink, sex and social interactions. As a result, there is considerable interest in a possible role of this brain region in so-called natural addictions…we and others have found that high levels of consumption of several types of natural rewards leads to the accumulation of … ΔFosB in (the) nucleus accumbens. This has been seen after high levels of wheel running as well as after chronic consumption of sucrose, high-fat food or sex. These findings suggest that ΔFosB in this brain region sensitizes animals not only for drug rewards but for natural rewards as well, and may contribute to states of natural addiction."[24]

He continues: "…it raises the interesting possibility that levels of ΔFosB in nucleus accumbens or perhaps other brain regions could be used as a biomarker to assess the state of activation of an individual's reward circuitry, as well as the degree to which an individual is 'addicted,' both during the development of an addiction and its gradual waning during extended withdrawal or treatment."[25] Subsequent ΔFosB studies have strengthened the concept of natural addiction, such as the Wallace paper, which examined the role of ΔFosB in overconsumption of two natural rewards, food and sex: "In summary, the work presented here provides evidence that, in addition to drugs of abuse, natural rewards induce ΔFosB levels in the NAc…our results raise the possibility that ΔFosB induction in the NAc may mediate not only key aspects of drug addiction, but also aspects of so-called natural addictions involving compulsive consumption of natural rewards."[26]

Whereas maintaining a certain physiologic level of reward incentive advantageous to the survival of the organism and species may be a role of ΔFosB, overexpression is associated with pathologic overconsumption and thus can be an indicator of addiction. For instance, when overexpression of ΔFosB was imposed through viral vectors in laboratory animals, they exhibited a hypersexual syndrome.[27]

DeltaFosB is a molecular switch, a transcription product that turns on other genes which initiate cascades important in neuroplasticity. For instance, ΔFosB increases dendritic spine density in medium spiny neurons in the NAc in addicted animals during extended periods of abstinence through stimulation of the protein Cdk5.[28] Other proteins such as Brain Derived Neurotrophic Factor (BDNF) accumulate during abstinence, and may be important in driving relapse.[29]

Powerful craving states associated with drug craving produce these morphologic changes in reward system neurons. These changes include dendritic arborization, and somal hypertrophy and atresia, as demonstrated in this illustration from Dr. Eric Nestler's landmark paper published in *Nature Neuroscience*, "Is there a common

pathway for addiction?"[30] Significantly, sexual activity has been found to produce dendritic arborization as well.[31] That sex can produce changes identical to drug addiction is telling, both from the survival/incentive and the addiction perspectives.

These switches are involved in producing visible neuroplastic change in neuronal populations specific to incentive pathways. Nature thus ensures that we will seek activities that support our survival, such as eating and sex. Salt is essential to our survival, and there is an interesting correlation with addiction and salt. Salt depletion causes a strong craving in animals so depleted, and this is also associated with similar dendritic changes in nerve cells to those already discussed with sex and drugs.[32] That salt and sex craving both are associated with neuroplastic change is not surprising from a survival standpoint; both are essential in this regard. We have mentioned that dendritic sprouting has been seen in these neuronal populations in drug rewards such as cocaine or amphetamine,[33] and significantly salt depletion has cross-sensitization effects to drugs as well.[34] This is not surprising in light of a recent paper published last year in the *Journal of the Proceedings of the National Academy of Sciences* (PNAS) of which I was a co-author. Our international team was anchored by eloquent work at Duke and Melbourne. Our paper was titled "Relation of addiction genes to hypothalamic gene changes subserving genesis and gratification of a classic instinct, sodium appetite."[35] We found that sodium depletion kindled expression of genes in the hypothalamus important in reward and neuroplasticity. Importantly, we found that blocking dopamine receptors decreased gratification by depressing reward incentive. Using gene set enrichment analysis we found that these gene sets—that is the ones mobilized by salt craving—are the same gene sets previously linked to cocaine and opioids. Of course, salt craving has of necessity phylogenetically conserved across all in biologic systems, whereas drug craving is the newcomer. As worded in our paper, "Drugs causing pleasure and addiction are comparatively recent and likely reflect usurping of … ancient systems with high survival value by the gratification of contemporary hedonic indulgences."[36] *National Geographic* described our paper as follows: "Cocaine Addiction Uses Same Brain Paths as Salt Craving," saying "Drugs hijack instinctual need for salt."[37]

I think our word "usurp" and their word "hijack" are accurate and descriptive with regard to what happens in addiction. These powerful survival cravings ensure that we will seek out these rewards or we will perish as individual organisms and as a species. Drug addiction usurps and hijacks these pathways and lies to the brain, telling the organism that it will die, it will perish, it if does not satiate the craving. Hence the difficulty with overcoming addiction though willpower alone, and the fallacy of trying to understand all addiction behaviorally without understanding or considering biology!

> The intervention and treatment modality must recognize the problem as a full addiction, and treat it with the same consideration given to alcohol or chemical substances.

Can behavior change the brain macroscopically? Of course! In 1995 the Elbert study published in Science demonstrated that increased use of the left hand in string players increased the corresponding cortical grey matter representing the fingers of the players, and this causative enlargement was dependent on the age at which the musician began studying.[38] Draganski's paper in Nature describes how structural changes in grey matter are induced by training.[39] The Schwenkreis study in 2007 demonstrated representative enlargement of the motor cortex associated with the left hand in violin players as compared to controls in support of the Elbert paper, and these authors summarized that "cortical asymmetries are the result of use-dependent plasticity as a specific consequence of extensive musical practice."[40]

Other studies reveal this cortical plasticity with use[41] or disuse.[42] The premise that the brain changes both micro- and macroscopically with learning is accepted by those esoteric to the field of neuroscience with little debate. Learning changes the brain, and we can image this structurally. Remember Kauer and Malenka's comment in their paper on synaptic plasticity and addiction, that "addiction represents a pathologic but powerful form of learning and memory?"[43] We should not be surprised to learn that addiction studies show cortical atresia macroscopically. Virtually every study on addiction has demonstrated atrophy of multiple areas of the brain, particularly those associated with frontal control and the reward centers. This is true for drug addictions such as to cocaine,[44] methamphetamine,[45] and opioids,[46] but also in behavioral conditions associated with pathologic overconsumption of natural rewards and behaviors such as food,[47] sex,[48] and Internet utilization.[49] Of course, these were correlative studies, and critics will point to the inevitable warts inherent in any correlative study. But in doing so they ignore the forest of prospective work on addiction and the cortical plasticity learning studies we have cited; it requires, in my opinion, either bias or ignorance to ignore significant causation in these structural addiction

studies. Interestingly, a recent study on methamphetamine addiction demonstrated a return to more normal cortical volumes with recovery from addiction, which also supports causation.[50]

An important component of ASAM's new addiction definition is the issue of hypofrontality, or impairment of executive function. This results in an inability to correctly weight the consequences of using drugs or engaging in behaviors pathologically as the OFC and cACG quit working and literally shrink. The 'brake pads' of the brain wear out. Fowler, Volkow, Kassed and Chang described an interesting parallel in a paper concerning frontal impairment in addiction: "…studies have shown that cocaine and methamphetamine reduce cellular activity in the orbitofrontal cortex, an area we rely on to make strategic, rather than impulsive, decisions. Patients with traumatic brain injuries to this area of the brain display problems—aggressiveness, poor judgment of future consequences, inability to inhibit inappropriate responses—that are similar to those observed in substance abusers."[51] As a neurosurgeon who has treated patients with frontal lobe impairment as a result of trauma, tumor, stroke, or bleeding, I agree that they can manifest this constellation of findings.

Before he gained his Ph.D. and became a well-published neuroscientist, Dr. Marc Lewis experienced addiction to virtually every drug imaginable. He wrote of his experiences in a book, "Memoirs of an Addicted Brain." He describes what the drug trips of the various drugs were like, and details how the cravings that led him to relapse over and over felt. He then explains the neuroscience behind the sensations and cravings. He said, "dopamine-powered desperation can change the brain forever, because its message of intense wanting narrows the field of synaptic change, focusing it like a powerful microscope on one particular reward. Whether in the service of food or heroin, love or gambling, dopamine forms a rut, a line of footprints in the neural flesh. And those footprints harden and become indelible, beating an intractable path to a highly specialized—and limited—pot of gold."[52]

Before it was considered accurate to use the addiction label with a natural addiction such as to pornography, as you have now heard from numerous neuroscientists and ASAM, President Gordon B. Hinckley used this word in General Conference when he said, "Continued exposure leads to addiction that is almost impossible to break."[53] That prominent neuroscientists and organizations such as ASAM are validating his words is remarkable; as a prophet he saw this from down the street and around the corner.

Overcoming this problem requires more than we have generally done in the past to address it. As Dr. John Haney said, "Since pornography can be an addiction, these 'just say no' types of approaches are likely to only create *more frustration and self-defeating ideation*… the intervention and treatment modality must *recognize the problem as a full addiction*, and treat it with the same consideration given to *alcohol or chemical substances*."[54] (emphasis added)

Regarding recovery, Dr. Victor Cline, a pioneering therapist in treating pornography addiction said:

> I have found that there are four major factors that most predict success in recovery. First, the individual must be personally motivated to be free of his addiction and possess a willingness to do whatever it takes to achieve success… You can never force a person to get well if he doesn't want to… Second, it is necessary to create a safe environment, which drastically reduces access to porn and other sexual triggers… Third, he should affiliate with a twelve-step support group… Fourth, the individual needs to select a counselor/therapist who has had special training and success in treating sexual addictions.[55]

Dr. Patrick Carnes, considered by many to be the world expert on sexual addiction, said of those who reach that strong recovery or growth stage (which usually takes at least two years to reach):

> Another characteristic of this growth stage is a deep abhorrence of one's old behavior. Once people in recovery have enough distance from their old problematic behaviors, they often have extremely visceral reactions when they think about them. Many say they look back almost in disbelief at some of the things they've done...
>
> By the time recovery reaches the growth stage, it no longer involves false starts. Consciousness of sobriety and of richer relationships has brought the person to a new level of being. And it's at this stage that people in recovery often talk about the compulsion of addictive behavior as a gift. They have experienced a depth of humanity that many people never achieve. Their compulsive or addictive behaviors and subsequent recovery have given them a greater perception, compassion, and presence. Not only do they serve as models for other recovering people who follow them, but they are literally helping our whole society heal.[56]

I agree with Dr. Carnes. We can learn much, as have my wife and I, from those who have experienced what can only be described as healing through the grace of the Atonement. Lehi's insight into addiction is compelling; he warns us not to "choose captivity and death"[57] by allowing the "will of the flesh, and the evil which is therein"[58] to become our will. I believe this happens when the mesolimbic reward systems become preeminent,

"which giveth the spirit of the devil power to captivate,"[59] or addict and enslave.

Two thousand years ago Paul, writing to Timothy about helping those struggling with sin used remarkably insightful words with regard to addiction. He wrote, "But the servant of the Lord must not strive, but be gentle unto all men, apt to teach, patient, in meekness instructing those that oppose themselves, if peradventure God will give them repentance to the acknowledging of the truth; And that they may recover themselves out of the snare of the devil, who are taken captive by him at his will."[60] Note the words "repentance" and "recover," with Paul clearly understanding the dual nature of addiction.

My wife and I have worked as program coordinators with LDS Family Services for almost four years, and we have been blessed to come to know many such individuals.

The principles of the Atonement so well presented in the LDS Twelve Steps for recovery from addiction can bless our lives as we apply them. A scripture that describes those who use these principles and live blessed lives in recovery is Mosiah 3:19:

> For the natural man is an enemy to God, and has been from the fall of Adam, and will be, forever and ever, unless he yields to the enticings of the Holy Spirit, and putteth off the natural man and becometh a saint through the atonement of Christ the Lord, and becometh as a child, submissive, meek, humble, patient, full of love, willing to submit to all things which the Lord seeth fit to inflict upon him, even as a child doth submit to his father.

I believe it is the power of childlike submission of our will to His that protects and/or heals us and our loved ones from the power of addiction. A fellow presenter at Education Week last year, Ben Hill, shared the following art and insight about this Harry Anderson painting (upper right). His other paintings of the Savior for which he was commissioned by the Church are well known to us; they adorn our chapels and temples. This one, however, he didn't do for the Church. What would you call it? Except Ye Become? Suffer Them Not?

The artist named it "What Happened to Your Hand?" That is the secret. When we finally become as a child, we begin to focus on His hands, on His sacrifice for us, and we learn to remember, to "always remember," His hands and His heart, that we may "always have" Him in our hearts. It is this process that unlocks His healing, whatever it is we seek that healing for. I testify of the Savior Jesus Christ and the power of His Atonement to heal and make whole. May we trust Him with our hearts and souls, and with regard to those who struggle with this problem, let us never give up on anyone, for He said, "For ye know not but what they will return and repent, and

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come unto me with full purpose of heart, and I shall heal them; and ye shall be the means of bringing salvation unto them."[61] May God be with us in this essential work.

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61. 3 Nephi 18:32

Update on
Atrial Fibrillation:
Prevalence, Impact, Treatment

by Jeffrey L Anderson, MD FACC FAHA FHRS MACP

Epidemiology and Burden of Disease

Atrial fibrillation (AF) is associated with a large burden of disease. AF is the most common sustained cardiac arrhythmia[1]. It currently affects 5.1 million Americans, preferentially affecting the elderly.[1, 2] Its prevalence is expected to increase to between 12 and 16 million by 2050. For adults over 40, the lifetime risk of developing AF is 1 in 4.[3]

AF is associated with significant reductions in quality of life. Although physical functioning generally is better than populations with heart failure, vitality, general and mental health, emotional role and social functioning all track closely with metrics for heart failure and are neither better nor worse than in those with recent myocardial infarction (MI).[4, 5]

Thromboembolic risk is the most direct and important consequence of AF. AF is a major cause of stroke in the elderly, increasing the risk of stroke five-fold[6, 7]; 15% of strokes in the US are attributable to AF.[8] Moreover, strokes caused by AF have worse severity than strokes from other causes.[9] The annual incidence of all-cause stroke in patients with AF is 5% but with a wide variance, depending on associated risk factors.[6] Further, stroke risk is present even in asymptomatic and paroxysmal AF.[10]

Pathophysiology of AF

Many common medical conditions are associated with, and causally contribute to, AF.[11-14] Leading the list are hypertension, advanced age, and valvular heart disease, especially mitral stenosis and regurgitation. Other major contributors are obesity, metabolic syndrome, diabetes; ischemic heart disease; heart failure and diastolic dysfunction; obstructive sleep apnea; physical inactivity; and thyrotoxicosis.

The key pathophysiologic mechanism leading to AF is dilatation/stretch of atrial tissue (especially, left atrium). Inflammation and fibrosis with reduced atrial compliance are frequently accompanying cellular changes.[12] Hypertension, vascular disease, left ventricular hypertrophy, diastolic dysfunction, and mitral regurgitation all may lead to these underlying common pathological changes. At a myocyte cellular level, stretch-channels are activated,

electrical recovery is dispersed, and pulmonary vein focal discharges are increased, all facilitating the initiation and/or persistence of AF.

In addition, when persistent, "AF begets AF." Adverse structural and electrophysiological remodeling occur: left atrial (LA) and LA appendage (LAA) dilatation and fibrosis occur, and there are decreases in calcium currents, shortening of atrial action potential duration, and increased importance of early activating potassium channels.[12, 13]

Consequent to the evolution of atrial pathophysiology, the pattern of AF evolves, from paroxysmal (self-terminating) to persistent (requiring medical intervention, e.g., cardioversion), to permanent (cardioversion resistant).[13]

Clinical Evaluation of AF

The clinical evaluation of AF should include assessment of etiology, and risk of embolic and antiarrhythmic drugs.[13] Thromboembolic risk and treatment of AF is dependent on etiology as well as patient factors. Some anatomic and functional disorders pose risks for specific antiarrhythmic drugs. At a minimum, an evaluation requires a medical history, physical examination, electrocardiogram, echocardiogram, and blood chemistries (including thyroid function testing [TSH]). A stress test may be performed if coronary artery disease (CAD) is suspected, and a chest X-ray (and possible pulmonary function testing) is performed if pulmonary disease is a consideration. Current guidelines emphasize the $CHADS_2$ risk scoring system for embolic risk assessment.

Treatment of AF

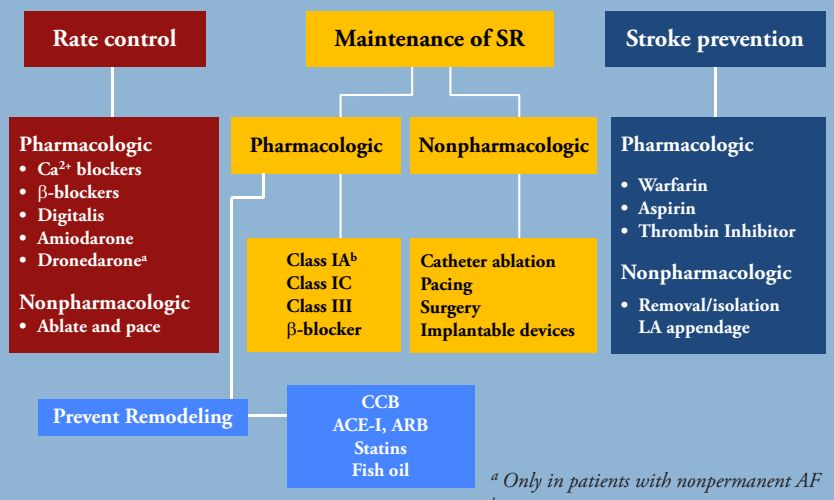
Three basic AF treatment considerations are rate control, rhythm control, and stroke prevention (anticoagulation) *(Figure 1)*. Each treatment goal includes pharmacologic and non-pharmacologic considerations.

Rate Control

AF often is accompanied by rapid, irregular, symptomatically distressing heart rates. These may cause severe palpitations, shortness of breath, dyspnea on exertion, and fatigue; over time, a tachycardia-related cardiomy-

opathy may develop. The endpoint for rate control is resting and ambulatory ventricular rates similar to those expected in sinus rhythm. These rates are best determined by Holter (24h ambulatory) monitoring. If assessed in an office setting, a rest ECG and rhythm strip should be supplemented by exertion and post-exertion determinations (i.e., during and rapid ambulation in hallways or stair climbing). Digitalis is most useful for rate control in sedentary patients and those with heart failure. Beta-blockers and/ or rate-slowing calcium channel blockers (verapamil, diltiazem) are needed in most active individuals. AV node ablation plus a ventricular pacemaker is reserved for the most resistant patients. A special consideration is the pre-excitation (WPW) syndrome, in which radiofrequency catheter ablation of the accessory connection (bypass pathway) may be not only effective but life-saving.

FIG 1. TREATMENT GOALS AND STRATEGIES



[a] Only in patients with nonpermanent AF
[b] the antiarrhythmic drug classes are based on the Vaughan Williams classification

RACE-II was a major contemporary randomized trial to compare a more lenient (heart rate <110 beats/min) versus a strict (<80 beats/min) rate control strategy in 613 patients with AF followed for 2-3 years. The primary outcome was cardiovascular death, heart failure hospitalization, stroke, embolism, bleeding, and life-threatening arrhythmia. Perhaps surprisingly, those in the lenient control arm faired at least as well as those allocated to strict control. Based on these findings, the 2011 ACCF/ AHA/HRS Focused Update Guideline on the Management of AF recommends against a strict rate control strategy in patients who have stable ventricular function and no or acceptable symptoms related to rate.[15] Nevertheless, careful monitoring of cardiac function over time is recommended to detect and treat cases of tachycardia-related cardiomyopathy (which may be reversible).

Preventing Thromboembolism

Current U.S. guidelines emphasize the $CHADS_2$ risk scoring system for embolic risk assessment and management choices in nonvalvular AF (valvular AF generally is considered high risk)[13] *(Table 1)*. The CHADS pneumonic stands for Cardiac failure, Hypertension, Age >=75, Diabetes, and Stroke. Prior stroke receives a score of 2, the others, 1, for a total of up to 6 points. For those at low risk ($CHADS_2$=0), aspirin 81-325mg/day is recommended. For those at moderate risk ($CHADS_2$=1), warfarin (international normalized ratio [INR] 2-3) or aspirin is acceptable. For those at high risk ($CHADS_2$>=2),

TABLE 1. RISK STRATIFICATION FOR AF: ANTI-THROMBOTIC THERAPY

Risk Category	*Recommendation*
Low Risk No moderate-risk factors $CHADS_2$ = 0	Aspirin, 81-325mg a day
Moderate Risk One moderate-risk factor $CHADS_2$ = 1	Aspirin, 81-325 mg a day or warfarin (INR 2.0-3.0)
High Risk Any high-risk factor OR ≥2 moderate-risk factors $CHADS_2$ = ≥2	Warfarin (INR 2.0-3.0*)

**INR 2.5-3.5 for prosthetic valves.*

Source: Fuster V, et al. Circulation. 2006;114(7):e257-e354

warfarin (INR 2-3) or a newer approved oral anticoagulant, is recommended.

A refined risk score, CHA_2DS_2-VASc risk score has been proposed in recent European AF guidelines.[16] This score, which may be especially helpful in better subclassifying those in the low to intermediate risk $CHADS_2$ strata, modifies $CHADS_2$ by giving 2 points for age>=75, 1 point for age 65-74, 1 point for female gender, and 1 point for vascular disease, for a maximum of 9 points. Those without risk factors (score=0) are given no therapy (preferred) or aspirin; those with one minor risk factor are given warfarin (preferred) or aspirin; and those with one or more major or two or more minor risk factors are treated with warfarin. (A newer oral anticoagulant may be substituted for warfarin.)

TABLE 2. THE NEW ANTICOAGULANTS

	*Rivaroxaban^*	*Apixaban*	*Dabigatran etexilate^*
Brand name/ Pharmaceutical	Xarleto®/ Bayer	Eliquis®/ BMS & Pfizer	Pradaxa®/ Boehringer Ingelheim
Target	Factor Xa	Factor Xa	Factor IIa
Pro-Drug	No	No	Yes
Bioavailability (%)	~80	~50	6-7
Time to Peak (h)	2-3	1-2	1.5
Half-life (h)	9-13	8-15	12-14
Renal Excretion (%)	66*	27	>80
Antidote / Dialysis	PTCC(?)/ not expected	PTCC(?)/ unlikely	None/ Yes
Effect on aPTT/PT*	1.8 / 2.6	1.2 / ~2	2.3 / NR
Effect on Xa	68%	NR	No effect
Food effect	Delays absorption	No effect	Delays absorption
Effect of Age	Variable		None
Effect of BMI	None	Variable by ~30%	None
Drug Interactions	CYP3A4 IND/INH	CYP3A4 INH	Verapamil/Quinine/ rifampin

**Estimated fold increase from baseline at peak levels.*

Derived from: Crowther. Blood. 2008;111:4871-4879; Garcia, D. Blood. 2010;115:15-20 http://www.eliquis.com/PDF/ELIQUIS%20%C2%AE%20(apixaban)%20SmPC.pdf

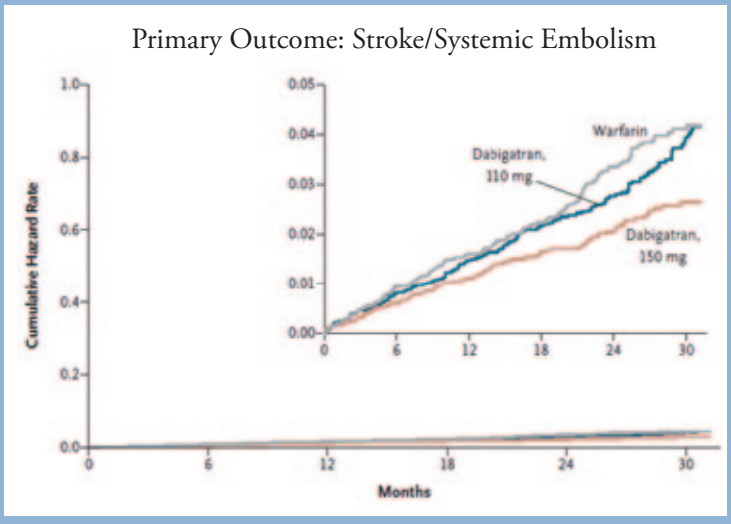
Warfarin has demonstrated effectiveness in reducing thromboembolic stroke associated with AF. In a meta-analysis of six classical randomized trials, stroke was reduced 62% (approaching 80% in compliant patients at target INR) and all-cause mortality, 26%.[17] However, warfarin has many limitations, including slow onset/offset of action, a narrow therapeutic window, multiple drug and food interactions, and large inter-individual variations in dose requirements, much of which is due to the impact of genetic variants on drug pharmacokinetics and pharmacodynamics. As a consequence, a minority of eligible patients are treated and treated effectively with warfarin. In one study of primary care practices, 65% of eligible patients were on no warfarin, 13% were subtherapeutic, 6% were above target INR, and only 15% were on warfarin and within target INR range.[18] These limitations have led to two initiatives: 1) the use of pharmacogenetic-guided algorithms to personalize warfarin dose-initiation, and 2) the development of new orally effective anticoagulants that target either factor IIa or Xa in the coagulation pathway and which do not require INR monitoring for dose-adjustment.

Warfarin inhibits the synthesis of coagulation factors X, IX, VII, and II. Common reduced-function variants in two genes, CYP2C9 and VKORC1, are responsible for 35-40% of individual warfarin dose-requirements, and clinical characteristics (i.e., weight and age) account for 10-15%. Using a pharmacogenetic/clinical (PG) algorithm for warfarin initiation, we found that PG-guidance selected an initial dose much closer to the eventual individual maintenance dose requirement than an empirically selected dose of 5 mg/day.[19] Further, PG-guidance (n=488 patients) was found to achieve a much higher percentage of time in therapeutic range (71%) over 1-3 months than empirical dosing (59%) in a parallel (non-randomized) cohort of patients (n=1866) in the Intermountain Healthcare system.[20] Similarly, PG-guidance was associated with fewer adverse thrombotic or bleeding events (4.5% versus 9.4%). A large randomized, national trial (COAG) is underway to further define the utility of PG-guidance of warfarin initiation. If successful, it may lead to incorporation of PG-guidance of warfarin into routine practice and to improved patient outcomes.

Two new orally effective anticoagulants recently have been approved for stroke prevention in non-valvular AF: dabigatran (Pradaxa®), a factor IIa (thrombin) inhibitor, and rivaroxaban (Xarelto®), a factor Xa inhibitor. Approval is expected later this year for another factor Xa inhibitor, apixaban. Selected characteristics of these new oral anticoagulants are summarized in *Table 2*.

RE-LY was the pivotal mega-trial leading to the approval of dabigatran for AF thrombo prevention[21] *(Figure 2)*. Two doses, 110 mg and 150 mg, given twice daily, were studied. Warfarin was the comparator. Higher dose dabigatran was superior to warfarin for preventing stroke or systemic embolism and was associated with a lower risk of intracranial hemorrhage, but it caused a higher rate of GI bleeding, MI, and dyspepsia. Lower dose dabigatran was non-inferior to warfarin for stroke prevention and had a lower risk of bleeding but was not approved by FDA. However, a 75mg dose has been released for patients with renal impairment (>80% of dabigatran is renally excreted). A safety concern for dabigatran is the absence of an effective antidote.

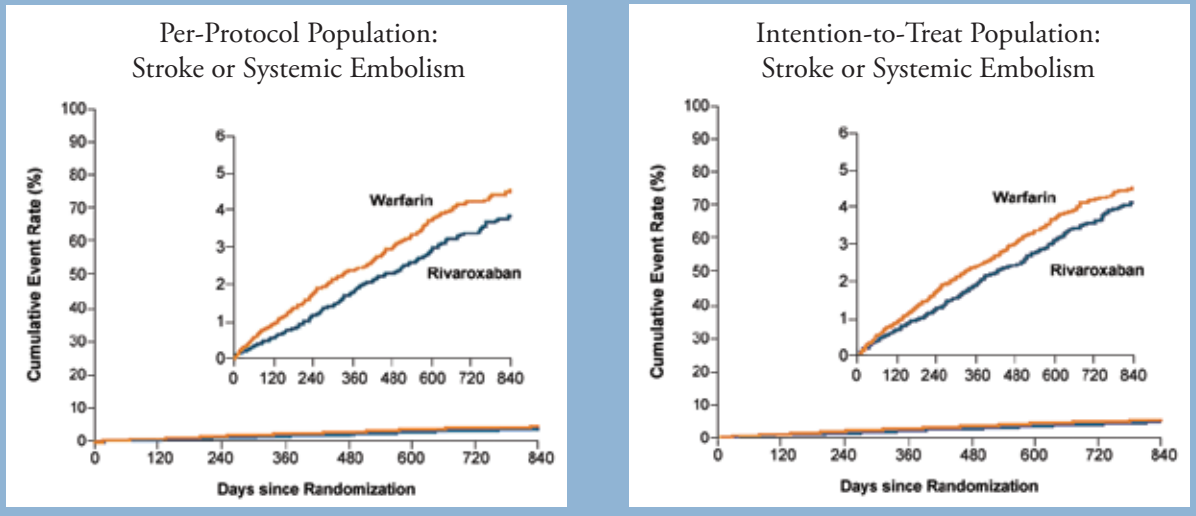
FIGURE 2. RE-LY: DABIGATRAN VS WARFARIN



Connolly SJ, et al; the RE-LY Steering Committee and Investigators. N Engl J Med. 2009;361(12):1139-1151

ROCKET-AF was the pivotal mega-trial leading to approval of rivaroxaban for AF-related stroke prevention[22] *(Figure 3)*. A dose of 20 mg once daily was tested (15 mg/day for creatinine clearance of 30-49 ml/min). Again, warfarin was the comparator. Stroke and systemic embolism rates were non-inferior to rates with warfarin and tended to be somewhat better (hazard ratio [HR] 0.88, p=0.12). Bleeding rates were similar except that, again, intracranial bleeding risk was less. Rivaroxaban also does not have a well-tested and approved antidote; prothrombin complex concentrate (PTCC) has shown promise in animal studies and small observational series.

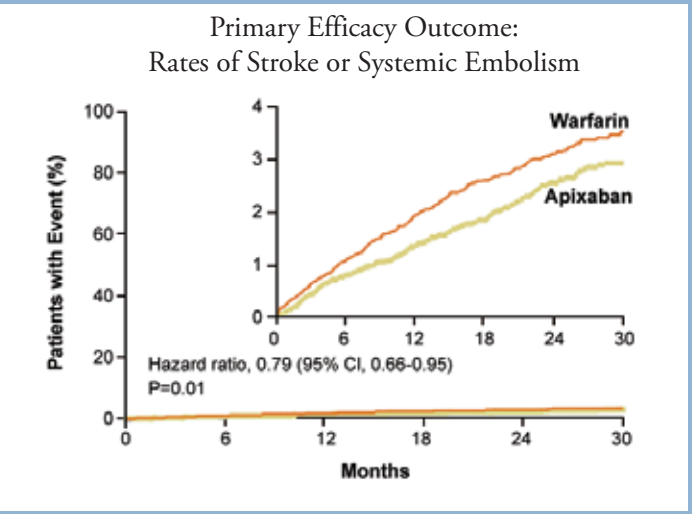
FIGURE 3. ROCKET-AF: RIVAROXABAN VS WARFARIN



Patel MR, et al; for the ROCKET AF Investigators. N Engl J Med. 2011;365(10):883-891

Apixaban performed successfully in the ARISTOTLE[23] (*Figure 4*) and AVERROES trials.[24] Warfarin was the comparator in ARISTOTLE, and aspirin in AVERROES, a trial in warfarin ineligible AF patients. In ARISTOTLE, apixaban 5 mg twice daily (2.5 mg in those at high bleeding risk) reduced the risk not only of stroke or systemic embolism (by 21%), but also major bleeding (by 31%) and total mortality (by 11%), giving its dosing regimen a uniquely favorable net clinical benefit among the major trials of these new agents. AVERROES was stopped early because of overwhelming incremental benefit compared to aspirin in warfarin ineligible patients (relative risk of stroke/systemic embolism=0.46, p<0.001) and with comparable bleeding risk. The effectiveness of PTCC as an antidote for apixaban-related bleeding appears promising but has not been tested.

FIGURE 4. ARISTOTLE: APIXABAN VS WARFARIN



Granger CB, et al; for the ARISTOTLE Committees and Investigators. N Engl J Med. 2011;365(11):981-992

In summary, these newer agents provide as great or greater reductions as warfarin in stroke/systemic embolism and mortality, and they reduce intracerebral hemorrhage by about one-half with generally similar risks of bleeding at other sites. Differences among agents may be explained as much by differing dosing regimens and populations as differing properties. In choosing between the two approved agents, there is more clinical experience to date with dabigatran, whereas convenience, mixed clearance, less dyspepsia, and lower MI risk may favor rivaroxaban. The lack of an antidote, especially for dabigatran, which is primarily renally excreted, is a persisting safety concern, especially in elderly patients with tenuous kidney function.

Atrial Occluder Devices for Stroke Prevention

Some patients are at excessive bleeding risk with oral anticoagulants or otherwise refuse to use them for other reasons. For them, the concept of an atrial occluder device is appealing. Over 90% of thromboemboli associated with AF arise from the left atrial appendage. Devices to occlude the atrial appendage have been developed and are in testing. The WATCHMAN® Device is the furthest along in testing. In PROTECT-AF (n=707 patients), the relative risk (RR) of stroke, systemic embolism or CV death was reduced by the WATCHMAN device versus warfarin (RR=0.62), which was highly significant for the non-inferiority hypothesis. However, safety events were increased (RR=1.69), including a 12.3% risk of procedural complications (pericardial effusion requiring draining and acute stroke).[25] However, improved safety was evident with increasing experience. The first generation WATCHMAN device did not receive FDA approval, but an improved second generation device currently is being tested. Successful testing and approval of this or other devices/methods to occlude the left atrial appendage, which are under investigation, hold the promise in the near future to extend stroke prevention to a large segment of at-risk patients with AF.

Antiarrhythmic Therapy for Rhythm Control

Physicians are not mandated to attempt to maintain AF patients in normal rhythm if they are asymptomatic and on effective rate control and anticoagulation therapies. That principle is underscored by the major studies of rate versus rhythm control using antiarrhythmic drug therapy (principally amiodarone), such as AFFIRM, which have failed to show a survival benefit.[26] Hence, the principal reason to use antiarrhythmic drugs for rhythm control is for relief of symptoms (e.g., palpitations, dyspnea, fatigue, light-headedness, etc.). The current algorithm for choice of antiarrhythmic drugs is shown in *Figure 5*.[13, 15]

This algorithm can be simplified in the following way: in patients without significant structural heart disease or mild LV hypertrophy, a class IC drug, such as flecainide, is safe and usually effective. Many of these patients present with the paroxysmal form of AF. In those with significant structural heart disease, e.g., heart failure, ischemic heart disease, hypertrophic disease, a class III or mixed-class

drug is recommended. Amiodarone is the prototype (albeit with long-term organ toxic potential) for this application with dofetilide and sotalol being alternative choices.

Recently, dronedarone was approved for management of AF. A congener of amiodarone but without the iodine moieties, dronedarone has less organ toxic potential (e.g., of lung, thyroid, skin), but it is a less potent antiarrhythmic. In the pivotal ATHENA trial,[27] it reduced the composite primary endpoint of CV hospitalization or mortality by 24%. However, efforts to show a benefit in extended populations with recent heart failure exacerbation (and without AF) and with permanent AF were stopped prematurely because of increased CV risk. Hence, the utility of dronedarone appears limited to classical indications for AF rhythm control in those who are not candidates for or have failed more traditional drugs.

FIG 5. RHYTHM CONTROL THERAPIES TO MAINTAIN SINUS RHYTHM

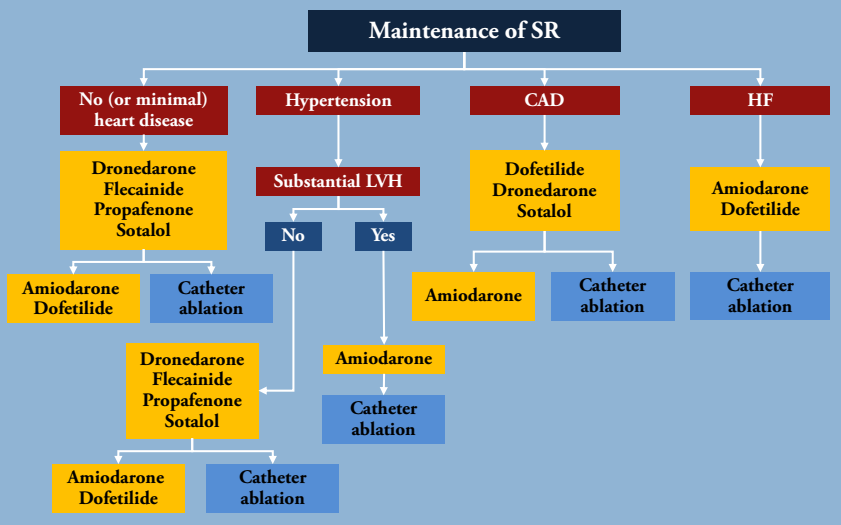


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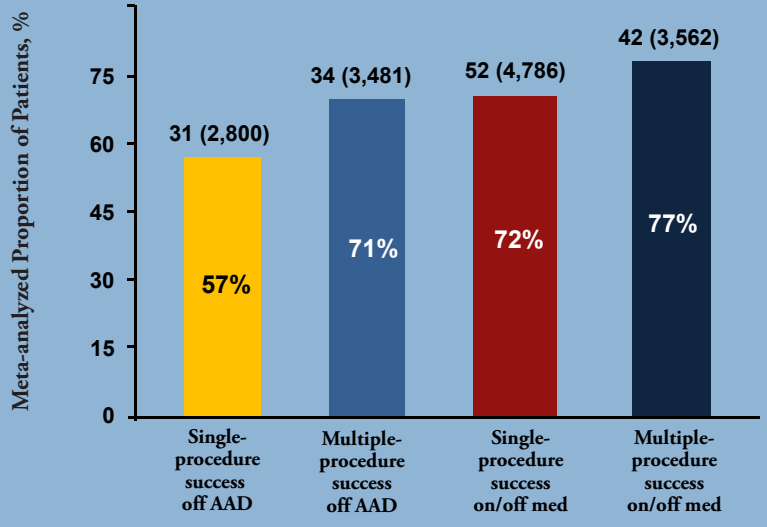
FIG 6. EFFICACY OF CATHETER ABLATION IN PATIENTS WITH AF



Adapted with permission from Calkins H, et al. Circ Arrhythmia Electrophysiol. 2009;2(4):349-361

Surgical and Catheter Ablation for AF

With the failure of antiarrhythmic drugs to effectively control AF in many symptomatic patients, surgical methods have been developed. The prototype Cox-Maze procedure, developed and applied in the 1990s, demonstrated the ability of surgically interrupting AF reentrant

circuits by an extensive "cut-and-sew" procedure, which isolated the trigger regions about the pulmonary vein orifices, and provided additional lines to the mitral annulus, left and right atria, and excised the LA appendage.[28] Although requiring extensive, time-consuming surgery, the Cox-Maze operation was a "proof-of-principle" that AF could be interrupted mechanically, with success rates approaching 90% in some series. More rapid and minimally invasive surgical approaches have since been developed and applied (e.g., with cryoablation) although they have shown somewhat lower rates of success.

Interest in developing less invasive, catheter-based approaches to AF control followed the Cox-Maze surgical procedures. Initial catheter-based approaches ablated the AV node, requiring a permanent RV pacemaker to activate the ventricles. This approach left the patient in AF, still requiring anticoagulation, did not restore AV synchrony, led to pacer dependence, and put the patient at risk for pacing-induced cardiomyopathy, but it nevertheless was successful in improving symptoms and LV function in many cases. Subsequently, more sophisticated catheter-based approaches have been developed, mimicking the Cox-Maze procedure, and have now become a standard option at major referral centers for managing drug-refractory, symptomatic AF. A common contemporary radiofrequency energy (RF) catheter ablation technique isolates the pulmonary veins with wide area encircling ablation lines, and is highly successful for paroxysmal AF (80%-90%). For those with persistent or permanent AF, additional lines are applied (e.g., interpulmonary vein lines, roof line, mitral annulus line). Success rates are lower (e.g., 60-70%), and a second (rarely third) procedure often is required[29] *(Figure 6)*. RF ablation in both cases is more successful than available antiarrhythmic drugs,[30, 31] and catheter ablation has achieved class I for symptomatic paroxysmal AF and class II status for symptomatic persistent AF who have failed at least one drug trial.[13, 15]

However, a mortality benefit has not yet been demonstrated for catheter ablation, and the risks of ablation, some fatal, have become recognized (e.g., atrial perforation with pericardial tamponade, pulmonary vein stenosis, stroke, esophageal fistula, phrenic nerve paralysis). To assess overall benefit-risk, a major randomized trial of catheter-ablation, supported by NIH, has been launched (CABANA). Results of CABANA may have far-reaching implications for the application of RF ablation in AF management.

Key Summary Points

In summary, AF is highly prevalent and is associated with a major health care burden. Rate and rhythm control plus anticoagulation are the three major treatment strategies. Rhythm control has a role for symptom reduction but has not been shown to improve survival or reduce stroke risk. Lenient rate control (i.e. HR<110 beats/min) appears to be at least as good as strict rate control, assuming adequate symptom relief. Traditional antiarrhythmic drug therapies may assist with symptom relief do not reduce mortality or need for anticoagulation. Catheter ablation is superior to antiarrhythmic drug therapy for rhythm control, but its impact on survival remains to be shown. Anticoagulation, based on risk assessment, plays a key role in reducing AF-related stroke and thromboembolic risk, and new medical and device-based options are appearing.

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GENOMIC MEDICINE:

Care Implications in Adolescent Idiopathic Scoliosis

JAMES W. OGILVIE, M.D.

"If it were not for the great variability in patients, medicine would be a science and not an art."

— Sir William Osler, 1894

This perceptive statement may have heralded the era of personalized medicine. Genomic medicine involves an understanding of the molecular basis for disease and is applicable for one patient's disorder. It is the personification of personalized and evidence-based medicine. It has the potential to individualize treatment to focus on those requiring early treatment. By identifying those with a benign prognosis, they can be spared the expense and anxiety of unnecessary therapy. Genetic prognostic testing becomes a surrogate outcome, enabling the clinician to craft therapy according to the individual patient.

Prognostic testing is different from susceptibility or diagnostic testing. Knowing that a patient has a 1% risk of a certain disorder may have little clinical utility compared with knowing what the disease outcome is in a patient with that disorder. DNA-based prognostic testing in malignancies such as bowel, breast, prostate cancer helps fashion the most effective treatment. Treatment based on one's personalized risk profile allows more efficient therapy.

Most medical prognoses are based on population statistics. A child with the diagnosis of mild (<25°) adolescent idiopathic scoliosis (AIS) can be given a prognosis based on the observation that 3-4% of skeletally immature AIS patients will progress to the severity where surgery is recommended.[1] This is a population-based statistic and may or may not be correct for a given patient.

AIS affects 3-4% of the population and accounts for 90% of all pediatric spine deformity. It involves females 5 times more commonly than males.[2] Active intervention frequently involves the use of bracing and surgery. A difficulty is the fact that 85% of those with mild AIS will not progress to the point of surgery if left untreated. It is not possible to identify those who will progress, and thus all children are followed with clinic visits and multiple X-rays to allow early identification. This results in potentially unnecessary physician visits and X-rays in addition to the anxiety experienced by patients and family. Because of this uncertainty, the U.S. Preventative Services Task Force recommended against routine school screening.[3]

In 2005 the New York Times published an article proclaiming that "Utah is an ideal genetic laboratory." The unique demographics of Utah, large families, excellent genealogical records, a low false parentage incidence, an outbred population secondary to wide dispersal of ethnic or national-origin settler groups, longevity enhanced by lifestyle choices, willingness to participate in family history research and an identifiable ancestry based on early immigration to the intermountain west all provide a unique environment for genetics research.

Our research utilizes a 36 million-name database that includes 33 million ancestors and 3 million descendents of the original Utah settlers. Using that database, we have constructed family pedigrees of subjects with AIS dating back to the 1500s. One 17-family group with AIS can trace ancestry to Essex in 1570 (with 29,000 descendants), and another 14-family group can trace back to Sussex in 1530.

It became apparent that AIS was a very familial disorder. From our database it was determined that 97% of those with AIS were related to other families with AIS.[4] Once AIS was found to have strong genetic determinants, there was reason to identify those genetic markers that were associated with AIS curve progression.

Our genome-wide association study (GWAS) identified more than 300 single nucleotide polymorphsims (SNPs) that were associated with curve progression in skeletally immature patients with mild AIS <25°. By using backward step-wise logistic regression, we found 53 SNP markers that were the most informative in predicting curve progression. A complex mathematical algorithm was used to calculate a risk of progression (ROP) score of 1-200. Those with an ROP score of <50 had a less than 1% risk of progressing without intervention to a severity where surgery was considered.[5]

The test has been validated in both Caucasian females and males. Additional research is needed to identify progression markers in Asian and African populations. Our initial findings are that these markers are different

Scoring risk-of-progression using genetic markers allows clinicians to provide care on a personalized prognosis, resulting in fewer clinic visits and X-rays for those with a low ROP.

than those in Caucasians. Our database contains more than 10,000 subjects of which <3% are from the inter-mountain west, and contains primarily those of European descent. Latinos are in a less well defined group. Their ancestry may include native American (Mayans, Aztecs, et al), African and European genes. The variance among ethnic groups is a fruitful area for additional research.

Our findings allow clinicians to provide care on a personalized prognosis, resulting in fewer clinic visits and X-rays for those with a low ROP. Diagnostic X-ray exposure during childhood poses a definable risk for future malignancy.[6-11] Lessening that risk results in both direct and indirect cost benefits to both patients and health care providers.

We examined the consecutive medical records of 151 patients with mild AIS <25° who retrospectively had their ROP determined and showed a less than 1% progression risk. They were all followed to skeletal maturity and thus their disease outcome was known. In the group, 32 received bracing and 119 were observed with follow-up and X-rays. There was no difference in the curve magnitude or age of those braced or observed. The average number of X-rays taken was 6.9, and no patient's curve progressed beyond 25° at the end of follow-up. The study suggests that none of the low ROP patients received benefit from bracing or X-rays while incurring the expense and inconvenience of medical care.

Current clinical practice includes physician visits and X-rays for all immature patients with AIS in order to identify those with progressive curves who may benefit from bracing. Prognostic testing could allow physicians to focus on those with a higher ROP and provide a less intense follow-up regimen for those at low risk.

The first objective of a prognostic test for curve progression in mild AIS has been achieved. Used as a gateway test prior to brace prescription, it can allow only those with an identified higher ROP to be treated. Additional research may provide insights into those patients that will be resistant to brace treatment and thus may be candidates for early innovative therapies. Characterization of the metabolic pathways involved in curve progression may lead to pharmacological treatments for the underlying pathogenesis on AIS.

Genomic prognostication as a surrogate for disease outcome has provided advances in medical care delivery and is the subject of current research. Its application to the diagnosis of AIS will improve the efficiency of care in this common disorder while also providing substantial economic and long-term benefits to patients and families.

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A Rationale for the Involvement of Religious Organizations *in* Humanitarian Service

by ALLEN C. CHRISTENSEN AND AARON MEACHAM

THE QUESTION HAS BEEN ASKED AS TO WHY RELIGIONS ORGANIZATIONS UNDERTAKE HUMANITARIAN WORK. Most traditions of faith have a body of principles that guide their thinking and direct their actions. Those common bonds can result in people giving of their time, talents and resources to aid others. Volunteer service seems to possess its own innate reward. Religious organizations frequently have many talented people, who serve without monetary reward. A large number of volunteers enable religious organizations to operate with lower administrative overhead. Consequently, most of the money contributed for specific projects goes directly to assist, rather than for payment of professional salaries.

Other non-governmental organizations (NGO) may or may not have a rallying point of common beliefs. However, many humanitarian groups are genuinely motivated to make a beneficial difference in the lives of others. A genuinely goodwill motive can serve as a rallying point. Broad-spread societal volunteerism enables governmental agencies to use their scarce resources to address other pressing issues. In the process of helping each other, neighbors and nations are drawn more closely together. Societal harmony is increased. Friendship replaces distrust and animosity.

Rationale for Humanitarian Service

In 2006, Christensen et al wrote: "More than two centuries ago, Thomas Paine wrote: 'These are the times that try men's souls.' He was writing of the events which ultimately led to America's war for independence. Yet, for many in the world, every day is a trying time. Crying children remind anxious, weary parents that there is insufficient food to eat, inadequate clothing to wear, and a future compromised by minimal educational opportunities. Their worry is not the deadly quarrel among nations; it is the struggle to survive, for hunger is an immediate and unrelenting enemy."

Hunger continues to strike at the heart of the traditional family. For example, in some parts of the world, one parent will leave home for extended periods in search of work to provide for the family. While they do send remittances, all too often when they return they bring home life-threatening diseases such as HIV that often leave the children bereft of both of their parents. On other occasions, some may discover that the emotional and social stability of the family has foundered in their absence. Clearly, religious organizations have within them a body of ethical principles that speak against such destructive behavior. They can act as the social conscience of the community by clarifying that such actions are counterproductive to societal harmony.

Dr. Norman Borlaug, the 1970 winner of the Nobel Peace Prize, whose work has been credited with saving hundreds of millions of lives from starvation, said in his lecture of acceptance of the Nobel Prize that an adequate supply of food is 'the first component of social justice . . . Otherwise there will be no peace." Edwin Price, director of the Borlaug Institute at Texas A&M University, said from Borlaug's days of seeing breadlines in the Great Depression that "Borlaug saw tension, and realized that hunger could cause people to behave violently."

Hunger and poverty provide fertile fields for armed revolt. Left without alternative, starving people have been forced to take desperate measures, and they sometimes do. Self-reliant, traditional families are the basis on which a peaceful society can be built. A critically important key in conflict resolution is finding sustainable, nutritional solutions for the poor. There is clearly a role to be played by all organizations of goodwill, whether they are religious or community organizations that are devoted to the common good. While neighbor can reach out to help neighbor, often the process of replacing despair with hope must be a congregational or a community matter. The task is too large for one to solve, but there is strength in many working together. Fascinatingly, those people who give service and support to others grow in compassion and concern for those who have little. Their ability to help is increased. Both the giver and the receiver are lifted together. Neighborhoods and nations are stabilized, and societal harmony is enhanced.

Latter-day Saint Perspective

The Church of Jesus Christ of Latter-day Saints (the Church) is a Christian faith that believes the application of the truths taught by Jesus Christ is paramount to living a happy life. For ultimate happiness, that life must reflect the values and commandments that He gave. For example, Jesus taught that the second great commandment was "to love thy neighbor as thyself." For those who are attempting to pattern the conduct of their lives after His, the mere profession of faith or belief is insufficient. Societal harmony requires that one's conduct toward family, neighbors and nations reflect the religious values prescribed by that faith, which values are manifested in goodly deeds.

Joseph Smith, the first president of the Church, gave clear direction as to what that principle should mean in the lives of those who are genuinely concerned for welfare and happiness. In 1840, he said: "A man filled with the love of God is not content with blessing his family alone, but ranges through the whole world, anxious to bless the whole human race."

Gordon B. Hinckley, long before he became the 15th president of the Church in 1995, wrote on unemployed fathers as follows: "A man out of work is of special moment to the Church because, deprived of his inheritance, he is on trial . . . for his integrity. As days lengthen into weeks and months and even years, the hurt grows deeper. He is sorely tempted to 'curse God and die.' Continued economic dependence breaks him; it humiliates him if he is strong, spoils him if he is weak. Sensitive or calloused, despondent or indifferent, rebellious or resigned—either way he is threatened with spiritual ruin, for the dole is an evil and idleness a curse. He becomes the seedbed of discontent, wrong thinking, alien beliefs. The Church cannot hope to save a man on Sunday if during the week it is a complacent witness to the crucifixion of his soul . . ."

This paper describes five programmatic initiatives that describe efforts undertaken by the Church's legal humanitarian entity, LDS Charities (LDSC), to address and find solutions to problems that negatively impact the human family. The funding for LDSC projects comes from the freewill offering of many individuals who are concerned about the welfare of others, especially those who seemingly have little, or those people who been confronted with the devastation of natural disasters. Our efforts to help are made without regard to individual or national belief systems. We have assisted those in difficulty in Asia, the Middle East, Africa, Europe, South America and in the United States.

The priority areas described reflect those initiatives that reflect our ability to serve effectively. The areas of emphasis and methodology used are discussed in some detail. We partner with other organizations that have similar core values or charitable motives. Local and host governmental agencies identify their needs. We respond to their requests as able. Our humanitarian agenda is not forced upon others. Yet, we work diligently to complete effectively those projects that we have committed to do. We bring our resources to assist. Where in-country staff is needed, we hire local expertise to complement our volunteers. We audit the expenditures of our resources in keeping with standard accounting and auditing procedures. We only come as invited guests, for it is our desire to improve human conditions in ways that are both sustainable and measureable in keeping with the laws and regulations of the nations with whom we serve.

1. Feeding the Hungry

Members of The Church of Jesus Christ of Latter-day Saints are expected to feed the hungry. A Book of Mormon prophet, Alma, saw great inequality among his people, for some lifted themselves in pride, despising others, and turning their backs on the hungry (see Alma 4:12).

1.1 The Welfare Program

In the midst of America's Great Depression, The Church of Jesus Christ of Latter-day Saints recognized an important principle: the poor could actually assist the poor. Millions of Americans were out of work. People who had been formerly employed found themselves without means of support. Women and children suffered greatly. Fathers and husbands felt degraded as they were unable to provide for their families. Leaders of vision realized that families would disintegrate; thereby producing even greater societal problems if something was not done to begin to correct the desperate situation. Work projects were found. The dignity of heads of families was protected. Hundreds of men went to work on farms for free. Crop prices were so low the farmer could not pay them. There was little demand for the farmer's produce. The farmers not only gave produce to the men who assisted in the harvest, they also gave more. These extra commodities from the harvest were distributed to help assist others in need. It became an effective program, where the poor helped others who were the poor. Gradually, economic and nutritional conditions were improved and human dignity was restored.

Out of that effort, a number of farms were developed. People gave their labor to grow food for those who had little. Those who could physically work did work. Physicians, professors, tradesmen, and the unskilled worked side by side to provide help for those who were unable. The abundance was stored against a day of need. That required the development of canneries where people again served as volunteers.

At the conclusion of World War II, Church president, George Albert Smith, asked the President of the United States, Harry S. Truman, for approval to ship many railcars of food to aid those who were starving in war-torn Europe. Approval was gladly given. Dutch members of the Church

grew potatoes to feed their hungry families. Then, realizing the plight of other Church members in Germany, the Dutch Latter-day Saints gave these potatoes to feed their starving former enemies. One leader said: "Charity is not giving the hungry dog a bone. Charity is giving a hungry dog a bone when you are just as hungry as the dog." Not only were lives spared and human suffering relieved, but brotherhood was enhanced. Societal harmony was increased.

1.2 Storehouse System

Since those humble beginnings in the 1930s, the Church has grown in its capacity and ability to do more. It operates farms and ranches to produce food. In many cases, much of the work to produce and harvest that food is provided by volunteers. One particularly touching example involves the production of raisins at a Church-owned vineyard in Madera, California. Except for one paid employee, all the work is done by volunteers, who give their time as a freewill offering. Hispanic members, rather recent immigrants to America, frequently must work six-days per week to provide for their families. However, they have routinely given up their Christmas holiday to prune the vineyard for the next growing season. They simply state that this service is their gift to the Christ child.

The development of a storehouse system has enabled the Church to be prepared to assist quickly in the face of natural disasters or other emergencies. Frequently, the Church is one of the first responders on the scene of a disaster. These days the Church brings supplies and member volunteers to assist in the cleanup and restoration of communities. Such efforts have been made in Indonesia in 2009 following the tsunami, in Louisiana following Hurricane Katrina, and in Haiti and Chile after they experienced devastating earthquakes in 2010. Hope replaced despair. The crying of hungry and frightened children was stilled. In the face of devastating disaster, bitterness was softened by the compassionate service of strangers. The principles of charity and compassion become attributes that motivate people to serve. Importantly, the storehouse of humankind includes more than supplies. It also includes the attributes and abilities of the members who give generously of their time and talents.

1.3 Self-Reliance

You ask: "What about the poor people who struggle in less-developed nations or elsewhere? Do you have any initiatives to assist them in their quest for self-reliance?" The answer is yes. We will provide three examples, one in Cambodia, a second in Ecuador, and a third among Native American peoples of Arizona.

These initiatives involve location-specific agricultural technology. Two things are required in any developmental effort: (1) Personnel who can train small farmers with improved ways of producing fruits, vegetables and small food animals; and (2) A minimum bundle of assets that enable the family to actually implement the training.

Cambodia

For example, In Cambodia, we worked with 3,000 small-farm rice growers in 92 villages near the capital Phnom Penh. Using a system for improving rice production developed at Cornell University, we were able to nearly triple the rice yields on these small farms. Frogs were introduced into the village irrigation ditches to provide a dietary source of animal protein to enhance the health and well-being of the farmers and their families. The participant farmers were provided with training and were coached throughout the project. The training was done through a Cambodian partner, an NGO, whose agronomists were degreed people who spoke the language of their people. Fertilizer and improved rice varieties were also introduced. Those innovations lifted them from a situation of economic deficiency to the point where a financial surplus was generated. That surplus then made possible the continued implementation of the improved technology after the project was concluded.

These changes were accomplished in a three-year period. The keys were providing training and a minimum bundle of assets, and the development of farmer cooperatives which allowed the farmers to buy inputs and market their rice crop with the power of a larger organization. Savings groups were organized among the villages that generated funds that were not immediately needed. Villagers could apply for loans of a maximum of three months to be used for individual initiatives such as the purchase of chicks, a piglet, vegetable seeds, fish fingerlings, or other inputs. These loans, made at a rate of 3 percent interest, are almost always repaid. Village women leaders were identified and social contacts and interaction had been increased. Five hundred farmers who had not been a part of the project watched and learned. They found resources to successfully implement the improved approach on their small farms. Farmers in less-developed nations do not lack intelligence. What is most often lacking is the training and minimal assets to jump start the improved technology.

Ecuador

The Ecuador project assisted small-farmers to use improved technology in the form of fertilizer, improved seed varieties, which are line-bred rather than hybrid varieties, as these small farmers tend to replant their own seed. A tool bank was established, much like a library, where implements could be rented for a small fee that enabled the repair and replacement of tools. Associations of "Farmer Friends" were organized to provide the needed training. People require training and encouragement to learn to work effectively together. Cooperation is not a spontaneous event. Development is a process, not a happening. While supplies and

inputs were provided, the families were required to do the following: (1) parents were required to attend all training sessions, (2) they were required to teach their neighbors, (3) they were required to send their children to school, (4) they were required to have their children vaccinated against preventable childhood diseases, and (5) the family was asked to save resources for future reinvestment so they could become self-reliant.

They were taught how to lay out a hectare of land to maximize nutrition, provide part of their production for sale, and to feed small animals such as chickens or guinea pigs to enhance the protein quality of the diet. Corn yield increased 300 percent of average. Bean yields were more than doubled. A vitamin-rich vegetable garden improved skin and hair health. After three-successful back-to-back crop cycles, these families were nutritionally and economically independent. The weight gains with children under-five had been dramatic, stunting was reversed in 20 percent of the cases, and school performance was enhanced. The father of one family said: "Before you taught us how to do this, we hardly had anything to eat. Now we have a different problem. We have so many choices that it can be difficult deciding what to eat." Some 80 percent of the participating families experienced excellent success. The others were not especially successful. It is that way with all endeavors.

Native Americans

Among the Navajo and Hopi peoples of northern Arizona, the approach has been different. They reside in a desert land. Water is scarce. Rainfalls are generally infrequent and not dependable. Cattle, sheep, and goats are free ranging. There are high winds during the May and June planting season. Those winds and the sand they blow can dust off the emerging crop plants. Gardens must be fenced. Wind screen must be fastened to the fence to protect the crops. The crops are irrigated with drip tape that has water emitters that drip water at the same rate anywhere along the line. The soil must have organic matter added in the form of animal manures and fine sawdust to help retain the water in these sandy soils. Nitrogen, phosphate and potash are added to the soil as well. Over the past 150 years these soils were poorly managed and seriously eroded. The local people did not think anything could be made to grow. The success of the gardens astonished them. For example, one garden from eight seeds of winter banana squash produced 500 lbs. of squash. One 20 foot row of potatoes yielded 100 lbs. of potatoes. Those crops can be stored for use through the winter months. People were taught how to harvest, prepare the foods grown, and also how various foods could be stored for use at a later time. Crops were also grown that could be consumed fresh during the summer season. At the end of the growing year, which runs from mid-May to mid-October, participants were taught how to store the wind screen, the drip lines, the water tank, and other materials so they could be used in subsequent years.

Those that teach the Navajo and Hopi people how to garden using this environmentally-friendly, but technologically-appropriate approach, were all volunteers. These are older couples, who pay their own way. As they serve others, they have marvelous experiences and build bridges across cultures. The walls of distrust, built during decades of mistrust and betrayal, are coming down. Friendships are forged. A Catholic nun, who lives nearby, attends the gardening class and receives inputs for her garden so that in turn, she can help others. This project, which began with two demonstration gardens and 35 families in 2009, will now involve 800 families in 2011. Twelve senior couples are volunteering their time and paying their own expenses to lift the long-overlooked. The joy they experience in their service, coupled with the feelings of appreciation from those who have been assisted with dignity and compassion, promotes remarkable societal harmony.

A key in all of this effort is to promote family self-reliance. Ultimately, most agencies tend to leave a given location and proceed to go elsewhere to help others. The question before any agency, religious or other humanitarian organization, is this: "Are those things which have been taught of lasting value, and have we stayed sufficient time so that the people we came to assist can care for themselves and lift others?

2. Education

Members of the Church are expected to further education in the countries where they live. "Education is the key to opportunity [and] with good employment skills, these young men and women can rise out of poverty…"

2.1 Importance

In the matter of encouraging human capital development among the impoverished, the ultimate success should be measured by distance traveled. The child of illiterate parents who earns a B.S. degree in agronomy may well have traveled economically and intellectually a much greater distance than the child of a physician who in turn, earns an M.D. degree. Our professional experience indicates the first step on the developmental ladder is the most difficult to reach. Subsequent steps are more easily attained as both the participant's confidence and capacity have been increased. Such evaluation is more subtle and difficult to determine than using purely statistical measures, economic or financial, in the process of evaluation. However, those who engage in development should be alert to measurable change and follow it whenever they can.

A religious organization can provide the opportunity for its members to make a small contribution to assist in the education of the poor as a part of their regular free-will offerings. When those contributions are combined, financial

resources will then be available to assist those who would have otherwise not had an opportunity to get an education. A lack of an avenue for personal improvement is a cause of societal disharmony, which disharmony is intensified when a society begins to be distinguished by ranks, which ranks have been created by riches, thereby depriving the poor an opportunity to achieve learning. There are young men and women of ability, who are unlearned because of their poverty. Yet, when the way is opened for them to gain a good education, frequently, remarkable people begin to surface and ultimately serve with distinction. Without such intervention, those individuals would have remained trapped in their impoverished economic state. When people from all walks of life begin to have an opportunity for education, one major cause of disharmony is minimized.

2.2 The Perpetual Education Fund

During the administration of President Gordon B. Hinckley, the Church initiated a new educational endeavor to address the educational needs of many overlooked, young people in less-developed nations. It is called the Perpetual Educational Fund (PEF), and was established in 2001. Since its founding, PEF has assisted 48,039 participants between the ages of 18 and 30 in 48 nations to obtain a good education and enhance the process of becoming self-reliant.

This is a loan fund rather than a scholarship grant. A minimal, low-rate of interest is charged. As loans are repaid, the number of young men and women that can be assisted is increased. The loans are for disciplines where there is a high likelihood of employability once the educational program has been completed. Saving to repay the loan promotes good financial habits. Such skills then assist the person long-term in the effort to achieve economic and social self-reliance. Consequently, self-esteem is enhanced and the individual sees in himself/herself a greater potential for achievement of worthwhile objectives in life.

The many individual contributors also take pleasure in the fact they have contributed to the growth and development of another. Both the giver and the recipient have kindly feelings toward each other. The giver takes joy in the success of the recipient. Such feeling increases overall harmony in any society or religious organization, for they too will have followed the admonition to love one's neighbor as one's self.

3. Water

Members of the Church are expected to help their neighbors in water deficit areas. "…I was thirsty, and ye gave me drink…"

3.1 Needs

Next to the oxygen in the atmosphere, water is the most important commodity required to sustain life. The World Health Organization (WHO) estimates that some 884 million people lack access to clean drinking water. Diseases that frequently are related to poor water supply and sanitation are major causes of illness and death, especially among children under the age of five years. For example, it is estimated there are four billion cases of diarrhea per year, which result in 2.2 million deaths, mostly among children under five. Adults and youth drinking impure water suffer as well. It is estimated that intestinal worms infect 10 percent of the population in the developing world. Depending on the severity of that infection, intestinal parasites lead to malnutrition, anemia, retarded growth, and diminished school performance. Trachoma has blinded some six million people. That disease is caused by a lack of water and poor sanitation. It is estimated that an adequate water supply could reduce the infection rate by 25 percent. Cholera is a worldwide problem that is intensified in emergency or disaster situations. Safe drinking water, sanitation and sound hygiene practices can prevent much of the cholera problem. Water borne illnesses keep children out of school. A study of Jamaican students ages 9 to 12 found that students suffering from trichuriasis were in class only half as often as non-infected peers. And when schools lack toilets, girls would often not attend. The Benson Institute's collaborators from the Institute for Agronomy and Veterinary Medicine, located at Rabat, Morocco found that at a rural school in the Middle Atlas Mountain Range, the girls stop coming to school when there were no toilets. However, when private toilets were constructed, the girls returned to school and slightly outnumbered the boys.

When people are ill, energy levels are decreased, and work accomplished is minimized. Work efficiency is further aggravated under conditions of environmental or weather extremes. In nations characterized by poor culinary water supplies, people often spend much of their physical energy walking distances to get water. One report indicated that on average, women and girls in developing nations walk six kilometers a day, carrying 20 liters of water, greatly reducing available time for other productive work or school attendance. Where the diet is only marginally adequate at best, distance and time required to get water and to provide needed hygiene, further exacerbate the problem. Women walking long distances to get water for their families increase the likelihood of being victims of violent crime. Children worn down by heavy physical work have less energy for their schoolwork thereby perpetuating conditions that are a part of poverty.

3.1 Community Self-Reliance

LDS Charities believes that water and sanitation are primary requisites to achieving family health. Members of the Church are expected to donate funds and labor for water and sanitation projects.

Water projects are aimed at strengthening families and communities, and the projects are done on a community basis. Our experience has been that community involvement both during construction and the subsequent operational phase are absolutely necessary to the achievement of long-term, sustainable success. Provision must be made for training in both the process of construction and the future operation of the system. The intended beneficiaries must understand at the outset that the funding organization will not be operating and funding maintenance for many years to come. This is to be their system. They must take the responsibilities associated with ownership. If the community is unwilling to do this, then difficulties will surely follow. All of the work that can be done by members of the community should be done by community members. No useful long-term purpose is served when well-intended organizations build a wonderful system and present it as a gift.

Community involvement in all phases of the project increases the likelihood of long-term success. We use a participatory approach to water development. The community decides on the management of the water facilities. They delegate via an election to give power to a water committee to conduct business on behalf of the community. The committee then becomes responsible for operation, management and fee collection for the water and sanitation facilities. This participatory approach in community training preserves dignity, builds self-esteem, and fosters the feeling of ownership.

In some locations, a hygiene-training program is also administered with the water project. Facilitators/trainers enable participants to discover the answers to their own problems through a series of picture-based activities and presentations, and through strategically designed questions that result in buy-in on the part of the intended beneficiaries. The cost of this training approach runs between $0.25 and $2.50 USD per beneficiary. Our experience has been that such training adds significantly to the life of the project.

At the operational outset, most community water systems work well initially. However, time or natural disasters will bring the need for repairs and periodic maintenance. There is a caution. As the system works effectively, sometimes community members will decide that it is really not necessary for the family to pay their water bills. If the community ceases to pay their bills, the best of water-delivery systems will, sooner or later, fall into disrepair and the water will cease to be clean and free from water-borne disease organisms. We have experienced such a problem.

Ecuador

It is important to develop and train community members to serve as members of the water users association. This should be done at every step of the project. As you do, the leadership will identify issues that you may have overlooked.

For example, in concert with an indigenous community in Ecuador, we jointly developed a community water system that delivered water to all of the homes. The design involved capturing the water from springs and seeps in the highlands above the community. As the project was nearing completion, the water association leaders came to us and said: "We need a permanent fence around the collection area." We replied: "We thought you already had such a fence?" They said that their fence was not permanent. As people noticed that the forage in the collection area had not been grazed, people then began letting down the fence to enable their livestock to eat the lush forage, thereby contaminating water with animal wastes and defeating the original purpose. Financing was found to erect a permanent fence. Instruction was given in both the national and tribal languages to the effect that they must now ask themselves if a little more forage for their livestock was more important than the health of their children. The process of repeating the instruction in both languages tends to maximize broad-spread understanding. Since beginning operation, this community has consistently paid their water bills. By frugally conserving their resources, they have been able to make small developmental loans to members of the community, as well as to keep the water system in a high state of repair. Such an integrated effort delivers clean water and simultaneously builds leadership.

Worldwide Scope

Members of the Church have contributed labor and funds for millions of people. To date, the water projects developed by LDS Charities and their community cooperators have assisted 6.8 million people in 64 nations to have access to clean water. Often these projects have provided sanitation facilities such as latrines, bathing, and washing facilities. This is an ongoing effort on our part to contribute to the Millennium Development Goal for water and sanitation by halving in 2015, the portion of the human family without access to safe water and basic sanitation. This effort must be achieved as the demand for water worldwide is increasing. Clearly, a religious organization, whose membership is willing to give a small amount regularly to this purpose, can be a significant player in bringing sustainable water supplies to many more people. This is an example of an application of where the kindness of others toward those whom they do not know, and probably will never meet, may be the most persuasive argument that one can offer that he or she really believes they should love their neighbor. There is great power where many make a small, yet affordable effort to lift others of the human family.

4. Human Health

Latter-day Saints have been taught and believe that the human body is a sacred gift from God. This belief leads us to help people everywhere take care of their health. "Cease to be idle; cease to be unclean; cease to find fault one with another; cease to sleep longer than is needful; retire to thy bed early, that ye may not be weary; arise early, that your bodies and your minds may be invigorated."

4.1 Neonatal Resuscitation Training (NRT)

Giving birth is a miraculous albeit a challenging experience. The birth process is complicated by difficult circumstances often found in developing nations. For example, where the maternal diet is iron deficient, the birth process becomes even more hazardous for women. LDS Charities has focused its effort on the well-being of the newborn infant. Inadequately trained physicians, nurses, and midwives often are unable to give the needed help to newborn children, help that often means the difference between life and death during those first few critical minutes of life. The death of a child can represent an immense physical and emotional toll on the mother, and subsequently the entire family. Friends and neighbors are saddened as well.

Based on data from 2008, 41 percent of annual deaths to children under the age of five occurred in neonates, or approximately 3.6 million deaths. Birth asphyxia is the cause of death in about 9 percent of those cases, or 814,000 babies. As many as 10 percent of all newborns have breathing difficulties at birth and require some assistance.

LDS Charities has worked collaboratively with national health organizations and ministries of health to identify areas where training in neonatal resuscitation is most needed. The goal has been to reduce infant mortality and disability in newborn children by having a qualified birth attendant present at every delivery. The NRT initiative trains in-country medical professionals in techniques to revive newly delivered infants who exhibit breathing difficulties. An advanced two-day course is provided for advanced-level professionals by Church volunteers using a text developed by the American Academy of Pediatrics and the American Heart Association. A basic two-day course is also available for nurses, midwives, and other professionals. Those completing the "train-the-trainer" courses use Church-donated "training kits" to train other health providers. The Church cooperates with health ministries, medical and nursing schools and major hospitals, including teaching hospitals, to arrange the training. The Church donates resuscitation equipment to maximize the likelihood that birth attendants will have the necessary equipment to effectively use their newly acquired skills to revive newborn infants.

Since this program began, LDS Charities has trained over 100,000 birth attendants, who have in turn, trained thousands more. In 2011, LDS Charities implemented 36 projects in 34 nations. It is a wonderful thing to hear a doctor or nurse report that the day following training they were able to save an infant's life they would have previously been unprepared to help.

Recently, LDS Charities has begun to implement projects using the Helping Babies Breathe program. This initiative is an evidence-based educational program designed to teach neonatal resuscitation techniques in resource-limited areas. Its primary aim is to change clinical practice across systems of care.

4.2 Measles Immunization

Measles is a highly-contagious virus that weakens the immune system and increases the risk for secondary health challenges that can be life-threatening. Prior to 2001, more than 750,000 children died from measles annually. A partnership including the American Red Cross, the Centers for Disease Control and Prevention, the United Nations Foundation, UNICEF, and the World Health Organization was organized with the expressed aim of reducing global measles mortality through mass vaccination campaigns and by strengthening routine immunization. Since then, more than 700 million children have been vaccinated as a result of this initiative, preventing an estimated 4.3 million deaths to children. Measles-related deaths have dropped 78 percent globally, including more than 92 percent reduction in Africa. This low-cost health intervention continues to be an effective means of preventing disease and limiting childhood deaths.

In 2003, the Church began its participation in the Measles Initiative. With Ministries of Health and the founding Measles Initiative partners providing the organization for the vaccination campaigns, the Church provided much-needed financial and non-monetary support. The non-monetary support proved to be valuable in alerting and educating people concerning the measles campaigns and the importance of immunizing their children. Since 2003, more than 59,000 Church members in 35 countries have served in social mobilization efforts. Church volunteers have gone door to door distributing information sheets, hanging posters and banners, sponsoring parades, developing radio and TV announcements, and assisting at vaccination posts. For many participants, it was their first experience as a "true volunteer" in their community. They gave their time and talents to this effort without remuneration. It developed in the volunteers a sense of pride in their community.

In reflecting on this effort, a Church-member volunteer, Kalu Iche Kalu of Aba, Nigeria stated: "I called our labor the 'rescue of the innocent.' We went house to house and village hall to village hall. A woman told us she had lost three children to measles. She told her story with such grace

and passion that there was not a dry eye in the house, mine included. The things you do for yourself are gone when you are gone, but the things that you do for others remain as your legacy."

In March 2009, more than 600 volunteers from the Church provided over 4,200 hours to assist with social mobilization efforts in a measles campaign in the islands of Cape Verde. Over 50,000 children were immunized. Isaias Da Rosa, a Church leader with oversight responsibilities on Cape Verde, said of the campaign: "This measles program has definitely broadened our own view regarding what we can do in terms of getting involved in the resolution of the problems impacting our communities…" Speaking of his experience, Antonio Pires, a local LDS leader on Fogo said "It was one of the most important moments in my life as I assisted the Health officials save the lives of our Cape Verdean children. I felt a great love when I saw all the children of our municipality receiving the vaccine against measles and polio. I could see love . . . in the face of each child that we helped."

4.3 Vision Care

There are estimates that perhaps as many as 40 million people in the world are blind. It is thought that perhaps 75 percent of blindness is treatable. Volunteer ophthalmologists assist medical care providers across the world with enhanced training and equipment to enable improved treatment of blindness among the poor. Since 2003, efforts made by the Church and its medical volunteers have assisted 506,000 people. In 2009, training and other assistance was provided in 23 nations.

Our approach targets underserved populations. It can include such activities as community eye health screening and corrective eye glasses. Strategies for prevention and reduction of vision problems are considered on a location-specific basis such as dietary vitamin A deficiency, trachoma, river blindness, and neonatal vision problems. Management training is provided to enhance eye care administrative practices. Development of sustainable rural eye clinics has been a part of some projects. Medical and surgical training by Church-service professionals has been accomplished when the host-country government authorizes such activities. To do that requires licensing, patient releases, etc. These projects are evaluated on reports provided by the host country six months after the project has been completed. Such evaluations are keys in identifying and determining the extent of project effectiveness and its long-term sustainability.

4.4 Human Mobility/Wheelchairs

Members of the Church where ever they live are expected to help their brothers and sisters have mobility. One factor that contributes greatly to human happiness and dignity is the ability to move about. It enables one to be involved in experiences that would not be possible were the individual confined to a room or bed. All right-thinking persons want to be contributors to their society. Immobility is a form of captivity. Dependence on someone else is virtually total. It is a case of always being served, and never being able to make a contribution of your own. It is not satisfying to simply be the object of another's pity. By contrast, to release an individual from such captivity by giving them mobility brings enthusiasm and new-found productivity to life.

Consider, for example, Jose Perez of the Dominican Republic, a young father living in a crowded corner of Santo Domingo. Before receiving his first wheelchair life was uncomfortable. He said: "A person without a wheelchair can't get integrated into society and does not feel they are a part of humanity. I never went out. I did not have friends. After receiving my first wheelchair, doors opened for me." The change in his life has been dramatic. Initially he was morose and worked at menial tasks. Now he is the receptionist at his place of employment. He is the first person people meet. He glows with hope and enthusiasm.

It is estimated that 20 million people in the world need a wheelchair but do not have one. This initiative has been developed to improve mobility, health, educational and economic opportunities for people with disabilities. The Church, through the help of local organizations and volunteer trainers, seeks to provide a wheelchair or a walking aid appropriate to the individual's circumstances. Efforts are made to strengthen the capability of local organizations and their capacity to assess individual needs and to fit the appropriate mobility device to the individual; training both the recipient and the caregiver, as well as providing support for repair and maintenance. The mobility devices include wheelchairs for rough terrain, hospital wheelchairs, crutches, walkers, and canes. Since 2002, LDS Charities has provided one of these devises to 415,000 people.

5. Emergency Response

Wherever Church members live they are expected to pitch in to help their neighbors recover from natural disasters. "Therefore all things whatsoever ye would that men should do to you, do ye even so to them: for this is the law and the prophets."

When a natural disaster has occurred, practical compassion requires that help to sustain and save life come quickly. The Church has a policy and a practice of being among the first responders. The pleas of widows and the cries of orphans require immediate attention if life is to be spared and normality reestablished quickly. The Church works in concert with appropriate local and national governmental officials to determine the priority of food and other supplies required to address the life-threatening situation that devastation has brought.

After the urgent needs are met, the Church then turns its attention to the long-term needs of the affected community. Fundamentally, a principal aim is to assist the people to become self-reliant. That objective is addressed by teaching new skills and by providing resources to assist the people to become self-reliant in a sustainable manner.

Indonesia Tsunami

One example of emergency response was assistance provided in December 2004 to the tsunami-hit areas of Indonesia, Thailand, and Sri Lanka. Partnering with Islamic Relief Worldwide, the Church sent food and emergency supplies from the United States to the devastated areas. Body bags for the deceased were purchased and shipped from China.

The Church continued to assist the area with long-term relief projects for five years. Homes, schools, medical facilities, and mosques (community centers) have been reconstructed with the assistance of local governments and companies. In some areas, Church leaders, missionaries, and Church members have worked to help individuals return to their livelihoods. Fishermen, farmers, and weavers have been given the necessary tools that enable them to work and provide for themselves, their families, and their communities.

Worldwide Scope

In the year 2010, the Church responded to flooding and landslides in 60 countries; hurricanes, typhoons and cyclones in 16 countries; major earthquakes in 5 countries; as well as other responses to refugee situations, tornadoes, severe weather events, disease outbreaks, wildfires, and famines. In total, in 2010 the Church and its members responded to 119 disasters in 58 countries.

Conclusion

In conclusion, we suggest that such efforts as have been described can and do increase societal harmony as neighbors and fellow citizens begin to take deep satisfaction in the well-being of others. Something rather remarkable happens when one realizes that he has made a beneficial difference in the life of another. It is, as the ancient apostle Paul wrote to early Christians in the Greek city of Corinth, two millennia ago: "For I mean not that other men be eased, and ye burdened: But by an equality, that now at this time your abundance may be a supply for their want, that their abundance also may be a supply for your want: that there may be an equality." Clearly, under such an approach, all are lifted together.

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7. Glen L. Rudd, "Three Times of Trial," an unpublished manuscript dated May 18, 2011, pp.2-3.

8. Glen L. Rudd quoted this statement by Harold B. Lee, who ultimately served as the 11th president of The Church of Jesus Christ of Latter-day Saints, in a personal communication with Allen C. Christensen, April 4, 2011.

9. The evaluation of the Cambodian Project was conducted by Dr. James H. Thomas, Professor Emeritus of Agriculture and International Development at Utah State University. Final evaluation report is on file with the LDS Food Initiative offices.

10. Gordon B. Hinckley, *Ensign*, May 2001, pg. 53.

11. An ancient American prophet wrote concerning a parallel situation among his people: "And the people began to be distinguished by ranks, according to their riches and their chances for learning; yea, some were ignorant because of their poverty, and others did receive great learning because of their riches. . . .And thus there became a great inequality in all the land..." 3 Nephi 6:12, 14. *The Book of Mormon: Another Testament of Jesus Christ*, 1981, p.418.

12. Kai Hintze, controller of the Perpetual Education Fund of The Church of Jesus Christ of Latter-day Saints, Salt Lake City, Utah, June 1, 2011.

13. Matthew 25:35, *New Testament*, Authorized Version.

14. http://.childinfo.org/water.html

15. http://www.unicef.org/wash/index_31600.html

16. The Ezra Taft Benson Agriculture and Food Institute established at Brigham Young University in 1975 in honor of former U.S. Secretary of Agriculture (1953-1961) Ezra Taft Benson, as an agency of experimentation whereby the agricultural resources of various lands could be evaluated, new technology developed and applied, and nutritional needs studied. Its efforts were merged with LDS Charities in January 2008.

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