





THE JOURNAL  
OF COLLEGIUM  
AESCULAPIUM

FALL 1999

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| <b>THE JOURNAL</b>  |
| <b>OF COLLEGIUM</b> |
| <b>AESCULAPIUM</b>  |
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A PERSONAL NOTE FROM THE EDITOR

*John Huntsman's stories about presidents, keeping your kids from dying of SIDS, pearls about antibiotics, an earthquake miracle, info about natural disasters, & tips about dry packing and being prepared*



What would you do if as a guest you are served rotten meat? Don't miss Jon Huntsman's story about what President Hunter did when this happened to him in Armenia. Can you imagine stuffing pieces of spoiled goat meat in the cuff of your pants? This is just one of the priceless stories John and Karen Huntsman share with us this issue. You'll also find insights about life from two of the most financially successful people in the world. And with all this success, these folks are so down to earth and humble that Jon wouldn't let me even mention some of the great things I know they are doing for the Church.

For decades as a pediatrician I coached parents to be sure to put their babies to sleep on their tummies — thinking that if they spit up in the night, they would choke and may die of SIDS. Now I know babies must be put to bed on their backs. Please read the strong evidence about SIDS being caused by babies sleeping on their tummies in Ron Stoddard's excellent article. Then copy this article and pass it on to every young parent in your family, in your practice, and neighborhood.

If you've heard Bruce Woolley talk about antibiotics, I know you'll want to read his update in this issue. And if you haven't, you need to know that this guy is the best resource there is for this information.

Then instead of learning some of the things I've learned about natural disasters by living through some and making some dumb mistakes, I hope the piece I wrote for you will be helpful. And along with learning through mistakes, we have learned some helpful things about using CO<sub>2</sub> in dry packing food in Mylar bags and some other tips about being prepared that I'd like to share with you. And you may have heard bits and pieces of the story about a missionary named Randy Ellsworth who survived being crushed by a falling concrete beam in Patzicia in the 1976 Guatemala earthquake. Well, here's the rest of the story.

The Collegium is still one of the best-kept secrets there is. Every physician in the Church should be a member — along with our Pharm. D. and podiatry colleagues. Please let your colleagues know about unique organization where we can share professional information along with spiritual insights. We need them — and they need Collegium. They need this journal, the outstanding meetings, and the association together.

*Glen C. Griffin, M.D.*

EDITOR

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*Glen C. Griffin, M.D. is on the faculty of the School of Family Life at BYU where he creating a new magazine called MARRIAGE & FAMILIES. Glen is the author of the new book, "It Takes a Parent to Raise a Child," and president of the American Family League whose [www.moviepicks.org](http://www.moviepicks.org) Web site helps you find videos (and the occasional new movie) that is decent and entertaining. Glen is also a clinical professor at the University of Utah School of Medicine and the coordinator for pediatric education at the Utah Valley Family Practice Residency program.*

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# An 11-year-old Piano Player, Prophets, & Presidents

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B Y J O N H U N T S M A N

ADDRESS GIVEN TO  
COLLEGIUM AESCULAPIUM

23 APRIL 1999



**I had just turned 12 years of age** when my father, who was a public school teacher in Southern Idaho, decided to go back to school. After teaching for seventeen years in rural Idaho where we had been raised, he was accepted at Stanford and was able to go to school on the G.I. bill. Our family moved to Palo Alto and lived in very cramped conditions at Stanford building, which was a part of student housing. Many of you have lived in student housing while going to school and know what I mean. Living in student housing is not easy with children, but it is a special challenge with teenagers.

My brother and I were 12 and 13, respectively, and I will never forget the great lessons I learned there about life, because we stayed in a village where sixteen families lived in a WWII Quonset hut. Our family income from the G.I. bill was \$120 a month. At age 12 my father gave me the job of being sure all the family medical bills were paid and that the family automobile was kept running. From ages 12 to 14, that was my job, and there were no questions asked.

The first Sunday our family was in Palo Alto, I walked into church and was assigned to pass the sacrament. As I entered the chapel, I looked over at the piano player, a beautiful little girl who was eleven years old. When it was my turn to pass the sacrament, instead of going to serve the bishop first, I went straight over to the pianist and served the sacrament to her. Following that meeting I was given a very personal lesson on church leadership and protocol about passing the sacrament first to the presiding priesthood authority. However, ten years later, I married that piano player, who happened to be the only daughter of Elder David B. Haight.

I thank Karen for being such a gracious and loving partner in life. We've had a great time. We had no idea in our lives that the Lord would bless us the way he has and that we would be the recipients of such great and remarkable blessings. It is something we never expected and didn't deserve. Yet we've been taught that "of him unto whom much is given much is required" (D&C 82:3). Although we never fully comprehended the meaning of that, today we feel a great duty, a great obligation, a great joy to try to return in some way what the Lord has blessed us with as temporary trustees. I feel very grateful and very humble to think that Karen and I have that remarkable obligation in our lives.

Our son says that I commit more to humanitarian projects than our company makes. I tell him that it's true — and that this is so he can work a little harder. We are currently engaged in about 120 projects around the world that help individuals who suffer, whether because of disease, hunger, lack of shelter or other basic needs of life.

A few months ago we had the president of Armenia

with us as a guest in our home. He is a humble man, a great lawyer, and a great leader. There are about eight and a half million Armenians in the world. Three-and-a-half million of them live in Armenia. The other five million are scattered throughout America, Argentina, Syria, Lebanon, Egypt, Russia, and many other countries. They're good people. I first met the president of Armenia after the terrible earthquake that occurred there on Dec. 7, 1988.

After I heard the news about the quake, I called a friend of mine who had recently returned from the Ukraine, where the Chernobyl accident wreaked havoc in that part of the country two years before. Many of you remember Dr. Armand Hammer. He was a bit controversial because he kept up a relationship with the Soviet leaders during the years of the fifties, sixties, and seventies. He knew Lenin and Trotsky in the early 1920s.

I was fortunate enough to have Dr. Hammer as a great friend, so I called him up and said, "Dr. Hammer, let's go to Armenia and help those people."

He said, "Jon, let's go; we'll go immediately."

I also told President Hinckley that we were going, and the day after the earthquake he sent a sizable check to the Soviet Ambassador to the United States in order to help provide medical care for the thousands left injured.

Dr. Hammer and I started a program to provide housing for some of the 500,000 Armenians that were left homeless after the quake. Unfortunately, Dr. Hammer passed away two years after we started, but I had promised the president of Armenia that I would like to see that we didn't leave the country until we built homes for 100,000 people. It is now 10 years later, and we've provided homes for about 40,000. We have about 60,000 more to go. It will take another 10 or 15 years, but we will not leave the country until we have fulfilled our commitment.

In the process, we have helped to establish the Church in Armenia, and many of the leaders of that wonderful country have joined the Church. And now, several Armenians have served full-time missions.

The First Presidency and I met with the president of Armenia, President Robert Kocharyan, while he was in Utah recently. It was rather a historic meeting. President Hinckley greeted the Armenian president warmly and looking right at him said, "Now, Robert is not an Armenian name. Is that your given name?"

I was a little surprised and a little embarrassed about such a question because Robert is a fairly common name in many countries of the world. But President Kocharyan's answer quickly quieted my concern and reminded me not to second-guess what the prophet should or shouldn't say. Turning to President Hinckley, the president of Armenia answered, "My name is Rupert. They nicknamed me Robert several years ago, but my real name is Rupert."



“Now that sounds much more Armenian!” President Hinckley responded confidently.

In a little briefing I had given President Hinckley before our meeting, I said something like: “Now President, I want you to know that President Kocharyan of Armenia is a very dear and close friend to Russia’s General Lebed, and General Lebed could well become president of Russia some day. The General is a very powerful leader there now and I think perhaps it would be wise to suggest to President Kocharyan that he may want to discuss the Church with other leaders of his part of the world, including the Russian leaders.”

President Hinckley did a masterful job of asking President Kocharyan to let the leaders of Russia and the surrounding countries know about our faith, our people, and our desire to bring families together, to have peace on the earth, and to obey the laws of the land. I was touched by the dignified and spiritual manner in which President Hinckley handled it.

President Kocharyan’s heart was also deeply touched. This great Armenian president is a highly respected, highly admired, and highly recognized leader in that part of the world. He could go back and talk about the Church in a way that none of us could ever do. As President Kocharyan left our home, he was very deeply moved by his meeting with President Hinckley. What a blessing it was for the prophet to visit with the president of that important country. I know that this was just one of many examples of how the Lord has opened doors to further His work.

Another one of these special opportunities to share gospel principles occurred a few months ago when I was interviewed by a reporter from a national magazine for a story focusing on the spiritual qualities of business leaders in America. The reporter wanted to know if there was anything in my work that was spiritual in nature. I replied, “Of course there is! It’s impossible to separate individuals from their spiritual lives and concepts of theology.”

He was a little surprised at how sure I was about this. “Explain that to me, Mr. Huntsman. I haven’t talked to any business leaders in these interviews who have expressed that to me.”

I went on to help him understand what I had said, “You can’t compartmentalize your life into your spiritual life, family life, and corporate or professional life — all are intertwined. They can’t be put in boxes and used whenever you want — say on a Sunday you just pull out one particular area of your life and on a Friday you pull out

another. Every day, every moment of every day, we look at our feelings, our faith, and our lives as one; they’re inseparable.”

Seeming puzzled, the reporter wanted to know more, “Give me an example of what that is. I’m not sure I understand you.”

“Well, let me explain it this way,” I answered. “I work with employees and their families. Sometimes there are two or three thousand gathered together; sometimes there are three, four, or five hundred. Wherever we were, I used to talk about things like plant productivity and cost efficiency and the environment and welfare. Today I talk about the fact that the most important work we will ever do is the work that we do in our own homes.”

I told this writer that all of my discussions now are centered on the home and family. It used to be difficult to talk to people about the Church, the Savior, my testimony, or my feelings. As I’ve grown a little older and wiser, however, I’m more grateful for the abundance the

Lord has given me. It has given me more confidence and as a result, I’ve become more direct in trying to explain what is really important in life.

In my office behind my desk I have a little plaque with a saying that reminds me that “The greatest exercise for the human heart is to reach down and lift another person up.” This is true. Many people have reached down and lifted us up, for

which we will be forever grateful. I think you might like to hear a little story about one of the times we tried to reach down and lift someone up. That someone happened to be President Howard W. Hunter.

President Hunter lived in our stake and for almost 30 years was one of my dearest and closest friends. My love for him was great. President Hunter was always having trouble with his health. In fact, he was not unlike Job of old, who had about every medical problem you know about. On one of the occasions when he had a very serious heart problem, we brought him home from the hospital where he had been for about eight days. Knowing President Hunter didn’t like to be confined, I called Elder M. Russell Ballard, another great friend who lived in our stake, and said “Elder Ballard, we had better get the President and take him for a ride to get some fresh air.”

He thought that that was a great idea, so I called the President and said, “Elder Ballard and I will be right over. You need to go out with us.”

He said, “Oh great, Jon.”

We put him in the back seat of the car and I said, “Where do you want to go, President?”

*“You can’t compartmentalize your life into your spiritual life, family life, and professional life,”  
I told the magazine reporter.  
“All are intertwined.  
They can’t be put in boxes and used whenever you want.”*

“How about some yogurt?” he replied.

So we took him out to a bunch of different frozen yogurt places because he liked strawberry frozen yogurt. We drove him around and then brought him back home. He had a wonderful time.

About a year later, Elder Ballard was in the hospital after having a kidney removed because of cancer. While he was there, President Hunter called me and said, “Don’t you think we ought to go over and get Elder Ballard and take him out for some frozen yogurt?”

I said, “We ought to, President.”

So I went and picked up the president and told Elder Ballard that he had better get ready because President Hunter and I were going to take him for a drive. Then President Hunter took us to all the same places where we had gotten strawberry frozen yogurt a year before.

About three years later, I had to go to the hospital because I had prostate cancer. Soon after getting home — still had tubes coming out and was in a lot of pain — the phone rang and President Hunter said, “We’ll be right over to get you!”

The doctor had told me not to get out for a few days, but I got in the back seat of the car anyway and President

Hunter and Elder Ballard drove me around and had me eat strawberry frozen yogurt! I never did have the heart to tell him that I didn’t like strawberries!

It was great to be with him. President Hunter just loved to travel, and we traveled together to Armenia and the Ukraine. On one trip to Armenia together, we were guests of the president of the country at a special dinner. Armenia is still a developing country, and at that particular time there was a power outage that had gone on for a while. And since there was no electricity, there was no refrigeration. The banquet was elegant and the chefs had made the food look particularly appealing — until we thought about what happens to food when it isn’t properly refrigerated.

As we sat down to dinner, President Hunter asked me what we were eating. I said that I thought it was lamb.

“Should I eat it?” he asked.

Not knowing quite what to say, I answered, “Why don’t you try a little bit first?”

He put a small bite of the meat in his mouth, frowned and said, “I think it’s spoiled.”

That’s when I came up with a profound plan, and whispered it to President Hunter, “Put little slices of the

## A Glimpse into Jon Huntsman *by Karen Huntsman*

I would like to tell you a little about someone I love very much and by whose side I have been for many years. Jon and I met in California and were married in the Los Angeles temple, and over the years have had nine children, eight of whom are married and have given us forty grandchildren. We have had the opportunity of building a wonderful business.

I think that the longer you are married, the better you learn to know each other. I want to tell you a simple story about something that happened early in our marriage that gave me great insight about my husband and that will give you a chance to know a little about him.

When we were first married, Jon was in the Navy so we lived in Coronado, near San Diego. After being married a few months, I noticed that \$50 was missing out of our budget every single month. I went to my husband to ask him if he knew where this \$50 was going, and he just brushed it off and said that he had taken care of it. I didn’t think any more about it until about eight months later when a woman stood up in



church and said that she had been receiving \$50 anonymously every month. It didn’t take long for me to figure out that the \$50 that was going to this woman was coming from my husband. I realized the size of his heart and where his priorities were at a very young age. At that time we were paying back loans for our schooling and I thought that our budget was pretty small, but no matter how much you’re making and no matter what walk of life you’re in, there is always someone out

there who can use our help.

I learned early on that my husband wanted to make a difference in people’s lives. And he went on to do that, over and over again. Through his business he has been able to touch many employees — thousands of them all over the world. They love to work for him. He spends as much time with a person who keeps the floors of the warehouse clean as he does with someone who may be on a computer someplace — he knows them all, and he greets them. At Christmastime everyone gets the same gift, the same greeting, whether

spoiled meat in the cuff of your pants,” I suggested.

“Good idea!” he whispered back. And that’s exactly what he did — carefully slipping little slices of the spoiled lamb in the cuffs of his pants, until it looked as if he had eaten all the meat on his plate. When the banquet was over, he graciously thanked our host for the delightful dinner and we left with President Hunter in the lead. I can still see him now. I wish I would have had a camera with me because seeing President Hunter walking out of that place with his pant cuffs bulging was a sight just too much to behold.

About eight months later, President Hunter was in the LDS hospital. He had been in a coma for nine days and had not said a word. Elder Ballard and I went to the hospital quite often to see him. On the ninth day, Sister Hunter said to me, “You know, Brother Jon, I just don’t know how we’re going to get him out of that coma.”

I said that I needed to talk to him. I went over to him and said, “President Hunter, I brought you some of that great meat from Armenia.”

He responded with a “Ho, ho, ho!” and 30 minutes later came out of his coma! From that point on, he improved quickly and came home two days later.

His wife couldn’t understand what had happened and said, “I don’t know how you woke him up from the coma.”

This was hard to explain, but I told her I didn’t think the president would ever forget stuffing some spoiled meat in his pant cuffs in Armenia.

It has been a great honor for our family to know President Hunter, President Kimball, President Benson, President Hinckley, and the other brethren. President Hinckley is absolutely amazing. He is constantly on the go — often giving several talks each day, day after day, teaching people in several countries in the matter of a few days. And he always looks and sounds vigorous and alert — quite a feat for a man who is 88 years old. He is so generous with his time. And with his willingness to keep up an intense travel pace, President Hinckley has personally shared his wisdom and his love with more people than any prophet in all of history.

All of us have talents and assets that we can share with others. Many are hungry for food. Even more are hungry for the gospel of Jesus Christ. Sharing our testimonies and what we can with others is the least each of us can do. May God bless you as you reach out to help people in your work and wherever you happen to be.

they’re a top executive or someone who runs a warehouse. I’m grateful for his heart and his soul and for touching other people’s lives.

When his mother was 50, we were informed that she had come down with breast cancer. Since she was living in Palo Alto at the time and we were living in Southern California, Jon would fly up to take care of his mother on weekends. We had great hopes that the doctors at Stanford that were treating her would be able to cure this dreaded disease and that she would have a long life. That wasn’t to be and she was taken at a young age.

Jon resolved at that time that if we were ever blessed with any extra money he would try to make a difference and help out in the field of cancer. We often wondered when and how that time would come. A few years ago, my husband himself was diagnosed with prostate cancer, and that made his desire to make a difference in the world of cancer even more prominent in his mind. After looking into various options, touring cancer centers throughout the world, and talking to the people who run the centers, he realized that the best thing he could do would be to start one here in our own state.

I’m grateful for his heart and his priorities in life. Above all, I am grateful for his honoring the priesthood and accepting any call to serve no matter what

the call has been. And I don’t think Jon has ever seemed taller than when he is on his knees, which has been often. I am grateful that he expresses his testimony and calls our family together for testimony meetings. Some of the choicest testimony meetings we have ever had in our whole lives have been within the walls of our home, where we heard expressions from each of our children and their spouses and now our grandchildren.

Recently we had the experience of taking a group of our 10-year-old grandchildren on a little vacation so we could be with them one-on-one. I watched Jon as he taught them what a testimony is and the importance of bearing testimony. We talked about our Heavenly Father and Jesus Christ. I watched as each 10-year-old stood up by his side to practice bearing their testimonies with their grandfather’s arm around them. I will always keep that wonderful picture of my husband in my heart as he taught his grandchildren things that he had taught his own children. It reminds me of how important it is for each of us always to continue to be a teacher and to reach out to the people around us — to make a difference in whatever capacity we can. And that’s exactly what Jon Huntsman does, every day.

# An Earthquake Miracle



*Told by*  
Glen C. Griffin, M.D.

**E**lder Randy Ellsworth and his companion were so sick the night before the 1976 Guatemala earthquake that they decided to sleep in the chapel next to the 10-foot by 10-foot adobe house they were staying in. Had they not slept in the chapel, they would surely have been killed by the adobe walls of that little house that I saw, which came crashing down where they would have been sleeping.

However, the Elders were not completely safe in the beautiful Patzicia chapel. Not only did its walls come down but so did a massive concrete beam which landed on Elder Ellsworth causing him great pain and pinning him to the stage of the cultural hall. Hearing agonizing cries for help, missionaries and townspeople — each of whom had lost loved ones themselves — came running to the church to try to help the young missionary. But even with all this help, it was impossible to lift the heavy beam off the missionary whose injuries were becoming more serious by the moment. As the hours passed, not only was the injury to the Elder's back becoming more serious, but the pressure impeded circulation so his legs became discolored and swollen leading to the more serious problem of hemolytic uremia with progressive kidney damage. Finally, Julio Salazar, a Guatemalan missionary, came up with a brilliant and inspired solution — to cut the stage out around the trapped missionary. No one thought this would work. To make it worse the rescuers had to crawl through rubble to reach Elder Ellsworth. A 7.3 aftershock compounded the danger. As debris came crashing down around them there was real concern that the weakened adobe walls would come down in full force crushing the rescuers. At that point Julio stopped and offered prayer, blessing the walls to stand until they could get him out. And they did. Another Elder, Gary Larsen, found a chain



saw. But it was out of gas. Unsuccessful in siphoning gas from a truck into the chain saw, someone disregarded safety sucked the gas into his mouth and spit it into the chain saw until there was enough gas to make it go. Soon a section of the stage was cut away. Supports under the stage were cut away. Bricks were propped under the concrete beam and Elder Ellsworth was freed from his entrapment. He was carefully put in a vehicle and transported to a hospital in Guatemala City. Two days later Dr. George Snell and I arrived in Guatemala and the mission president took us immediately to see his critically injured missionary. It didn't take long to assess the situation. Besides severe back injuries, Elder Ellsworth's legs were discolored and massively swollen. There was no urine output. The BUN was elevated — how high no one remembers — but a lab slip in Randy's possession records a potassium level of 9.3 which had caused an episode of cardiac arrest. Now, he was comatose and dying of renal failure. Without the availability of dialysis, the doctors had given him up for dead.

Because of aftershocks, the airport had been closed. There would be no more flights in or out of Guatemala — excepting one U.S. Air force cargo plane that we learned would be leaving soon for Panama. Brother Goodman, a counselor in the mission presidency, and an official in

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*(Left) Before the 1976 earthquake, this was a beautiful chapel in the town of Patzicia in the Guatemala Highlands. A huge concrete beam fell on a sleeping missionary, Elder Randy Ellsworth, who was trapped under it for hours*

*(Above) Dr. Ellsworth and Julio Salazar were recently reunited. Elder Salazar was the missionary who blessed the walls of the chapel to stay up and eventually freed Elder Ellsworth from the concrete beam.*

the United States Embassy, communicated by radio with the commander of the Air force plane. When President Goodman asked permission for our dying young missionary to go on this plane to Panama so he could receive life-saving dialysis, permission was denied. He was a civilian. I then told President Goodman to get the Air force commander back on the radio and to tell him that we were bringing this young U.S. citizen to the airport and that we were not asking permission — he was going on that plane to Panama. And that's exactly what we did. But getting this semi-conscious missionary with severe back injuries and dying of renal failure to the airport was no easy task. There were no stretchers so tied him to it with some ripped up sheets to a door that we took down. After moving Elder Ellsworth onto our make-shift stretcher, we ran into another obstacle. We couldn't maneuver the door-stretcher through the narrow outside door. So we untied our seldom-conscious patient from the door and retied him to a ten-inch plank, and loaded him into the ambulance.

When I use the word "ambulance," don't think this was a modern EMT vehicle. It wasn't. This rickety old vehicle looked more like an old-fashioned milk truck. There were no medical supplies, no gurney, nothing — except

two rough wood benches, one on each side of the truck. Once Dr. Snell, President Arnold, his counselor, Randy Ellsworth, and I were all in this vehicle that may have been built before shock absorbers were invented, it started moving — hitting every hole that had been in the road before the earthquake as well as the new ones caused by the quake. President Arnold gave his missionary a powerful blessing — en route. I don't remember exactly what was said in the blessing, but the promises seemed much greater than the medical realities or probabilities. Looking back at that experience, I should say of myself, "Oh me of little faith."

Arriving at the Guatemala airport in the darkness of the night, the ambulance driver proceeded onto the tarmac to the Air force plane. I still don't know how it all happened. After all the permission denials on the radio when we were at the hospital, I don't think anyone asked a single question. But there was no jetway — or even one of those stairways on wheels that are sometimes pushed up to an airplane at small airports. Seeing that the access to the plane was a fold-down ladder, I wondered how we would ever get the unconscious missionary tied to a plank with torn pieces of sheet up that ladder and into the plane. No problem. Several Air force enlisted men positioned them-



*Had Elder Ellsworth and his companion not been so sick that they slept in the chapel, they would have been crushed to death by the walls of the tiny adobe house they were to have been in that night.*

*Besides the chapel, the earthquake left thousands of people without homes or anywhere to go for shelter.*





*With the Patzicia chapel totally destroyed, an inspirational fast and testimony was held outside the Sunday following the 1976 earthquake*

*Everyone at that meeting had lost loved ones in the earthquake.*



selves on the ladder and passed the board with our heavy patient up into the plane.

Climbing into the plane, the stretcher board was anchored onto its floor and we decided George would go with Randy to Panama to cut through any remaining red tape and to be sure he received the needed lifesaving dialysis.

Elder Ellsworth received the peritoneal dialysis and was transferred to George Washington University Hospital in Washington for further treatment. During Elder Ellsworth's recovery, President Gerald Ford heard his story and invited him to a White House dinner — after which Randy was interviewed on network television. Although still in a great deal of pain and just barely able to get around on crutches, when asked what he planned to do, Elder Ellsworth explained that he had been called by a prophet to teach the gospel and he intended to return to Guatemala to do just that.

Watching this news report at his home in Salt Lake, the story goes that President Thomas S. Monson, turned to his wife and said something like, "This young man doesn't understand the gravity of his situation. We don't send missionaries back into the field when they can't even walk." It wasn't long before Elder Randy Ellsworth was sitting in President Monson's office receiving permission

to continue his mission in Guatemala. His new mission president, Robert O'Donnell, asked him about his faith and challenged him to put away his crutches and walk. He did — with great difficulty and discomfort and was sent back up to the Guatemalan Highlands where he preached the gospel to the Indian people he loves so much. For rehabilitation he worked his way up to walking ten to twenty kilometers a day.

I next heard about Randy Ellsworth when President Monson told his story in a general priesthood meeting. Later I heard that after Randy Ellsworth had completed his mission he finished college and went to medical school followed by a residency in ophthalmology. But our paths didn't cross again until December of 1994 when someone called the guy sitting in front of us in the Marriott Center, "Dr. Ellsworth." I tapped him on the shoulder and introduced myself as the guy who had helped him get on the Air force plane when he was semi-comatose after his earthquake accident. Besides our friendship growing, we went back to Guatemala together a couple of times to work on setting up schools for Guatemalan Indian children in Chimaltenango and Patzicia — where our paths had crossed those many years before when the earth shook and a huge concrete beam had tumbled on top of him.

SUDDEN  
INFANT  
DEATH  
SYNDROME

BY RONALD A. STODDARD, M.D.





## **R**ECENTLY I HAD THE SPECIAL EXPERIENCE OF HOLDING MY FIRST GRANDCHILD IN MY OWN ARMS.

Jason Landon Beutler was born on October 3, 1998 at Alta Bates Hospital in Berkeley, California. He is a healthy full term infant with light blonde hair and baby blue eyes. Although my wife and I have had five children of our own, the feelings that I experienced in holding the first of a new generation in our family were very tender and unique. The months of pregnancy for my daughter were not easy ones for me and I worried more about the well-being of my grandchild than I had about the births of our own children. My study of neonatology had made me very aware of the many things which could go wrong in pregnancy and delivery. It was such a relief to have him born at term and without any significant problems or complications.

As I rocked this precious child and considered the miracle of birth, many thoughts flooded my consciousness. What would my grandson achieve in life? Would he be a productive, happy, loving individual? Would he love sports and excel in basketball like his father? Would he become a lawyer like his father or would he choose a field in medicine like his mother? Most of his life would be in a new millennium — what would happen in the world during the course of his lifetime? Would he have the wisdom to obey his parents and follow a living prophet? Where would he serve his full-time mission?

In the midst of these pleasant thoughts, something very troublesome came to my mind. What if Landon did not live to be an adult? What if he did not survive infancy? He certainly appeared to be a healthy young man with no life-threatening problems, but my medical knowledge would not allow me to be completely comfortable with that information. For the past twenty years of my professional career my interest has been captured by a devastating problem. This “disease” often affects healthy term infants without warning and is called crib death or sudden infant death syndrome (SIDS). It strikes without warning, leaving families with crumbled hopes and dreams.

SIDS has been defined as “the sudden death of any infant or young child, which is unexpected by history, and in which a thorough postmortem examination fails to demonstrate an adequate cause for death.”<sup>1</sup> The average birth weight of babies who die of SIDS is six and one half pounds; male infants have a 50% increased risk compared to females; it occurs most commonly between two and four months of age; and it has a seasonal peak during the winter months.<sup>2</sup> These factors weighed heavily on my mind since my grandson weighed six pounds eleven ounces at birth and would be two to four months of age

during the winter months.

Over the years, few areas of medicine have been studied as well as SIDS. After the neonatal period, it is the most common cause of death in the first year of life. The incidence varies in certain areas of the world and with certain ethnic groups, but it generally has been about 1.5 to 2.0 per thousand live births in the United States (more than 7,000 deaths/year).<sup>3</sup> Literally thousands of papers have been published on the subject describing the epidemiology and pathophysiology of SIDS.

Some of the maternal and antenatal risk factors include:

1. Intrauterine hypoxia.
2. Maternal infections during pregnancy.
3. Maternal cigarette smoking and drug use.
4. Low socioeconomic and educational status.
5. Young maternal age and short interpregnancy interval.
6. Having a previous child with SIDS.

Neonatal risk factors include:

1. Prematurity and fetal growth retardation.
2. Being two to four months of age during the winter months.
3. Not breast feeding.
4. Signs of a preceding mild illness.
5. Prone sleeping position
6. Over bundling and overheating.

For some time it was feared that immunizations may cause SIDS, but studies have confirmed that there is no statistical association, and the relationship is coincidental because immunizations are standardly given at the time when the incidence of SIDS is the highest.<sup>4</sup>

In the 1960s and 1970s, the apnea hypothesis for the cause of SIDS originated. Since that time, organizations and individuals studying SIDS and apnea have worked together trying to define the association and causation. Certain infants who experience an apparent life threatening event (ALTE), are at high risk for the recurrence of such events and possibly SIDS. ALTE is a frightening event with some combination of apnea, color change, limpness, choking, or gagging. The observer fears that the infant has either died or is close to death. These events require careful evaluation and home monitoring for a period of time if no etiology is found.<sup>5</sup> Unfortunately, screening studies to look for abnormal breathing patterns have not consistently identified infants who would die of crib death. Many have argued that home monitoring has never been proven to decrease the incidence of SIDS, but despite the increase in survival of smaller and sicker pre-

## APPROPRIATE SLEEPING POSITION



## INAPPROPRIATE SLEEPING POSITIONS



mature infants (a population with a higher risk for SIDS), there has never been an increase in the incidence of SIDS. Although there is continued controversy concerning the role of home monitoring, it has been a blessing to most families where there is a real or perceived concern about the infant.

As SIDS was studied more intently in the 1970s and 1980s, it became apparent that there were multiple subtle findings at autopsy that indicated that these infants may not be entirely healthy as was originally thought. Multiple tissue markers of hypoxia and hypoxemia were found and it became more apparent that SIDS may be the consequence of subtle physiologic defects present at birth rather than a single catastrophic event.<sup>6</sup> This information, along with the knowledge that SIDS does not usually occur in the first month of life, led to the “trigger” theory of SIDS. Simply stated, this is the hypothesis that antenatal hypoxia leads to microscopic injury to the respiratory center of the brain. This same injury would be responsible for the pathologic markers so often seen at autopsy in SIDS infants. The injury would be subclinical until the infant’s body is faced with a stress (such as a mild infection which would be more common in the winter months). In the face of the stress, the damaged respiratory center fails to maintain adequate respirations and the infant dies during sleep. This would also explain the fact that infants are spared during the first month of life since the levels of maternal antibody would be protective of infection in the newborn, thus preventing the “trigger”.

With this information, medical recommendations for the prevention of SIDS during the 1980s became:

1. Avoid anything that would cause hypoxia in the pregnant mother (smoking, infection, low blood pressure, etc.)
2. Plan conception for mid-summer (thus the infant would be born in the spring)
3. Avoid crowds and exposure of the newborn infant.<sup>7</sup>

Despite intense study and well intended recommendations, the incidence of SIDS remained fairly constant for decades. In the late 1980s, information became available that placing infants in the supine position (on their backs) might decrease the incidence of SIDS.<sup>8</sup> In the United States, these articles were met with great skepticism because the studies were done in countries where the incidence of SIDS was much higher than in the U.S. Placing infants on their back in these countries dropped the incidence of SIDS to rates similar to those in the U.S. where virtually all babies were placed prone (on their tummies). Researchers in the United States were very concerned about an epidemic of aspiration if all infants were placed supine. It was also noted that the countries where the supine positioning was shown to be most effective were countries where natural fiber bedding was used which may have “suffocated” some of these infants when placed prone. Even after the American Academy of Pediatrics came out with its statement in 1992 that all infants should be placed on either their side or back to sleep, many medical professionals in the United States were not convinced that it would have an impact.<sup>9</sup>

In the early 1990s a very large, well done study of SIDS was published by Dr. Peter Fleming from Bristol, Avon County, England.<sup>10</sup> This study contained compelling data on the association of three important factors with SIDS:

1. Prone sleeping position
2. Over bundling of the infant.
3. Cigarette smoke in the infant’s environment.

In this county-wide study with a population the size of the state of Utah, he showed that not only were these factors associated with SIDS, but after launching a campaign to place infants supine, not over bundle them, and keep cigarette smoke out of the environment, he was able to drop the SIDS rate by 70%. There was a drop from 1.5

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AS DR. FLEMING'S RECOMMENDATIONS HAVE BEEN IMPLEMENTED THROUGH THE "BACK TO SLEEP" CAMPAIGN LAUNCHED IN THE EARLY 1990s, THE SIDS RATE HAS DROPPED DRAMATICALLY NATIONWIDE. IN 1990, 75 BABIES DIED OF SIDS IN UTAH. DESPITE INCREASED NUMBERS OF BIRTHS, ONLY 22 INFANTS DIED OF CRIB DEATH IN UTAH IN 1996.

deaths per thousand live births per year to 0.5 deaths per thousand live births per year. After Dr. Fleming's data became known in the United States, the skeptics vanished and a nationwide campaign was launched to educate the medical community and parents about the importance of these factors. Dr. Fleming did not find that the side-lying position was protective.

As Dr. Fleming's recommendations have been implemented throughout the world, the results have been remarkable. When I came to Utah in 1986, we consistently had 75 to 80 babies die each year of SIDS. With the "Back to Sleep" campaign launched in the early 1990s we have seen a dramatic drop in the SIDS rate in this state as well as nationwide as more people are placing infants supine. There has been a steady fall in the number of crib deaths every year in the state of Utah. In 1990, 75 babies died of SIDS in Utah. Despite increased numbers of births, only 22 infants died of crib death in Utah in 1996.

Infants need to be in the prone position some of the time during waking hours for optimal neuromotor development and to prevent flattening of the back of the skull. The supine position is for the times when the infant is put down to sleep. Although we don't entirely understand the mechanism for how supine positioning helps prevent SIDS, we do know that it works. Many babies are alive today because of caretakers who follow these recommendations:

1. Always place your baby on its back to sleep.
2. Do not over bundle your infant.
3. Do not allow anyone to smoke in your baby's environment.

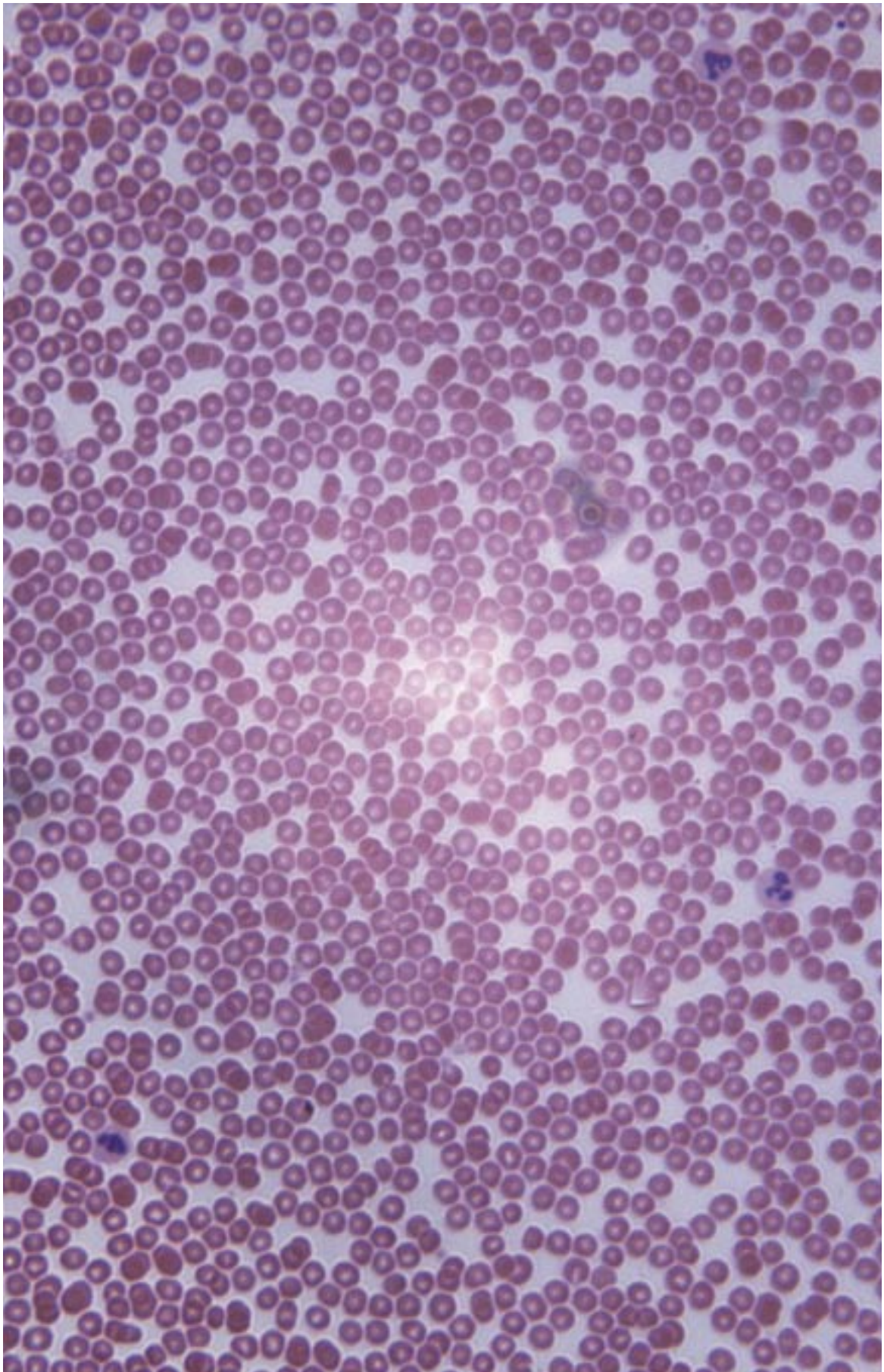
Although I cannot be assured that my grandson will not die of SIDS, it is a great comfort to me that he was born in 1998 when we have the knowledge of supine

positioning. In an era of high-technology medicine where we deal daily with expensive tests and equipment, it is amazing that something as simple as placing an infant on his back to sleep can have such a dramatic impact on his survival.

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# *The* Evolution *of* Antibiotics

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*by*  
BRUCE H. WOOLLEY, PHARM.D.  
*and*  
KENNETH HUNT  
*First-year medical student*

“The Lord hath created medicines out of the earth; and he that is wise will not abhor them” (Ecclesiastes 38:4).

**D**uring his search for such medicines, Selman A. Waksman, a biochemist and pioneer in soil microbiology, discovered streptomycin, neomycin, and many other antibiotics. Most of them were too weak to serve as therapeutic agents, or too toxic for human use. Waksman coined the term “antibiotics” to refer to a group of compounds produced by microorganisms which can inhibit the growth of other microorganisms, or even destroy them.

Today, antibiotics are the widely distributed “cure-all” for bacterial infections. Upon winning the Nobel Prize in 1952, Waksman predicted that future research would lead to the discovery of more active and less toxic agents and powerful combinations of antibiotic and synthetic compounds. We have witnessed the passing of his predictions and now envision the effect of warnings issued in his time; overuse and misuse of antibiotics have revealed adverse side effects and the development of drug-resistant strains.

#### HISTORY OF MICROBIAL THERAPY

Bacterial infections have afflicted civilizations for millennia. Tuberculosis was a major killer in ancient Egypt, *Yersinia pestis* resulted in the Black Death of medieval Europe, and Malaria, a bacterial disease, has been called one of the biggest killers in human history. During Christ’s ministry on earth, leprosy and certain venereal diseases were widespread as mentioned in the Bible (find biblical citation). Hippocrates wrote extensively on natural causes of disease, but generally ignored its transmission. In fact, it took more than 2000 years for medical science to develop an adequate theory regarding the spreading of disease.

Though causes of disease were not known, the use of molds and other crude materials to treat superficial infections can be traced back to at least 1500 B.C. through Egyptian papyri. It was not, however, until the late 19th century that the pioneering work of French chemist Louis Pasteur and German physician Robert Koch fully established the “germ theory” of disease, demonstrating that bacteria or other microbes were responsible for infectious diseases. By the end of the 1800s, virulent bacteria were recognized as a major contributor to disease. Preventive therapies were under development, many of them by Paul Ehrlich. Salvarsan, Erlich’s developed cure for syphilis, was used to treat the disease until World War II. Pasteur also noted that the growth of bacteria responsible for causing anthrax could be prevented by the presence of a contaminating fungus or mold; he suggested that this observation had therapeutic implications. This inhibition of growth of one organism by another was eventually

termed “antibiosis” by the French biologist Paul Vuillemin in 1890.

#### ALEXANDER FLEMING AND PENICILLIN

The antibiotic era truly began in 1928 with Alexander Fleming’s discovery of penicillin. Penicillin was, however, not the first antibiotic that he had discovered. Six years earlier, he discovered Lysozyme in tears and nasal secretions. He called the enzyme a “powerful antibacterial ferment” and part of a human’s natural defense.

Alexander Fleming graduated from St. Mary’s Medical School in London in 1908. As a member of the Royal Army Medical Corps during World War I, Fleming developed a keen interest in antibacterial agents. Attending to infected wounds, a common ailment during battles, he was convinced that the chemical antiseptics they utilized were more lethal to tissues than to invading bacteria. After the war, Fleming returned to his laboratory at St. Mary’s to continue his antimicrobial research.

The events that followed are considered the beginnings of penicillin. A spore of the mold *Penicillium notatum* entered his untidy laboratory through an open window and settled on a petri dish containing staphylococci bacteria. Upon returning from a vacation, Fleming discovered that all bacteria within the vicinity of the germinating spores were eradicated. Fleming pursued this observed method of antibiosis and discovered that even crude, dilute preparations of penicillin stopped the growth of bacteria, but it was essentially harmless to white blood cells.

It was not until World War II, however, that penicillin reached the mainstream of antimicrobial therapies. In

**TABLE 1: MECHANISMS OF ACTION**

- 
- *Inhibition of cell wall synthesis*
  - *Alteration of membrane integrity*
  - *Inhibition of protein synthesis*
  - *Inhibition of nucleic acid synthesis*
-



1945, Fleming, along with Howard Walter Florey and Ernst Boris Chain, received the Nobel Prize for physiology and chemistry for the discovery of penicillin. Further experiments proved that penicillin was active against staphylococcus, streptococcus, and several other pathogens. Research continued and by 1948, mass production of penicillin was underway at pharmaceutical plants throughout the world.

#### CURRENT ANTIBIOTIC THERAPIES

As more antimicrobial compounds and mechanisms have been elucidated, the arsenal of antibiotic therapies has grown substantially. This article will take a simplistic approach to the discussion of antibiotic mechanisms of action; the various families of antibiotics will be considered accordingly.

#### *Mechanisms of Action*

The task assigned to antibiotics is relatively straightforward: inhibit bacterial cells without altering human cells. To accomplish this function, antibiotics must take advantage of the dissimilarities between prokaryotic and eukaryotic cells. There are four general antibiotic mechanisms of action (*Table 1*). Each of them addresses a different structural or biochemical difference between cells.

A prokaryotic, or bacterial cell is a single-celled organism that lacks a well-defined nucleus and is enclosed by a membrane. The genetic material is a single strand of DNA and prokaryotes lack most organelles found in animal cells, including mitochondria. All bacteria are, however, surrounded by a rigid complex cell wall composed of peptidoglycan, and contain ribosomes which are distinctly smaller than those in higher organisms. Inhibition of the synthesis and growth of this cell wall stops bacterial growth at the cellular level. Many of the beta-lactam antibiotics, including pioneer penicillins and cephalosporins, suppress the growth of bacteria by destroying the proteoglycan cell wall.

The integrity of the bacterial membrane can be disrupted by agents that act directly upon the cell membrane. This interference alters the permeability of the membrane, leading to leakage of intracellular compounds. Polymyxin and Colistimethane fall into this category.

Another method of exploiting the differences between prokaryotes and eukaryotes is in the ribosomal structure. The subunits of ribosomes are larger in human cells than they are in bacteria. Thus, agents which alter or destroy the smaller 30 S or 50 S ribosomal subunits of bacteria will impede the production of bacterial proteins while leaving mammalian cells unaffected. Bacteria which are unable to produce proteins will die out swiftly. Chloramphenicol, the macrolides, the aminoglycosides, and the

**TABLE 2: SEVEN NEW CLASSES OF ANTIBIOTICS**

- 
- *Augmented penicillins*
  - *Carbapenems*
  - *Carbacephams*
  - *Monobactams*
  - *Thienamycins*
  - *Fluoroquinolones*
  - *Azilides*
- 

tetracyclines are examples of bacteriostatic drugs which inhibit bacterial protein synthesis; the mechanism will be discussed at length later in the article.

Finally, nucleic acid synthesis can be inhibited by antibiotic agents in two ways. Certain agents, such as the rifamycins, inhibit DNA dependent RNA Polymerase. Other drugs, such as the quinolone family, inhibit DNA gyrase, the enzyme that prevents excessive supercoiling during DNA replication and transcription. There is also the possibility that some antimicrobial compounds block bacterial conversion of Para-Amino Benzoic Acid (PABA) to tetrahydrofolate (THF), a necessary cofactor in DNA synthesis.

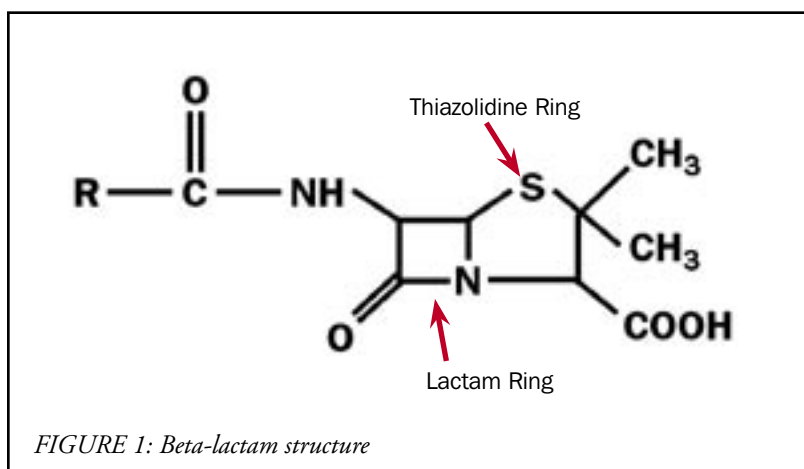
Presently, we are unaware of the precise mechanisms of all known antibacterial drugs; additional categories are likely to emerge as more complex mechanisms of action are determined.

#### ANTIBIOTIC FAMILIES

During the 1940s and 1950s, the golden age of antibiotics, many valuable antibiotics were discovered and purified. The discovery of novel agents, however, halted in 1960; most of the antibiotics introduced since are slight modifications of the original drugs. Modern antibiotics can be classified as either beta-lactam or non-beta-lactam molecules. Within each classification, there are various families which increase in size and number to keep up with demands placed on science by the earth's resilient bacteria. In addition to traditional antibiotics, the past eight years have introduced seven new classes of antibiotics (*Table 2*). Though based on their predecessors, these compounds bring new weapons to the arsenal of antibiotic therapies.

#### *Beta-Lactams*

Beta-lactam antibiotics comprise the pioneers and perhaps most important group of antibiotics. They include penicillins, cephalosporins, and several newer species. The mechanism of action for this class is inhibition of bacterial cell wall synthesis. Although several processes may be



responsible for this inhibition, interference with terminal peptidoglycan cross-linking is the most probable. This terminal event in bacterial cell wall formation is essential for many bacteria, but is primarily used to combat the gram positive species. There are currently more than 100 beta-lactam antibiotics in use today.

**Penicillins:** Although several other antimicrobial agents have been produced since penicillin became available, these are still widely used antibiotics. Penicillin G, the first antibiotic to come into broad use, remains one of the cheapest, safest, and most effective antibacterial treatments available. Penicillin V is similar in its activity to penicillin G, but because it is not destroyed by stomach acid it is the more commonly used oral form. Penicillins G and V are the drugs of choice for treating many gram-positive bacterial infections. Thus, they are still used to treat infections caused by gram-positive *Staphylococcus aureus*, *Streptococcus pyogenes* (strep throat), and *Streptococcus pneumoniae* (respiratory tract infections). These penicillins are also used to treat the sexually transmitted diseases gonorrhea and syphilis.

Methicillin was the first penicillin to have activity against the staphylococcal strains that were resistant to penicillin G. Other penicillins with similar activity are cloxacillin and dicloxacillin; they have the property of being orally active, unlike methicillin. Ampicillin and amoxicillin are similar antibiotics with a broader spectrum of activity than earlier penicillins, as they are active against common gram-negative bacteria as well as gram-positive bacteria. But they are not active against penicillin G resistant staphylococci. Both are effective on oral administration and are active against the gram-negative bacterium *Escherichia coli* (a common cause of urinary tract

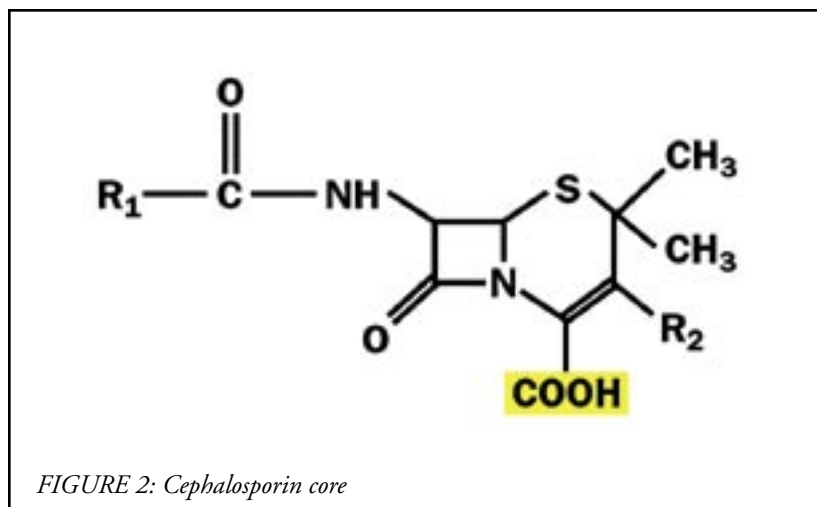
infections), *Haemophilus influenzae* (an important cause of ear infections and meningitis in infants), and *Salmonella typhi* (responsible for typhoid fever). Carbenicillin was the first penicillin synthesized to possess useful activity against *Pseudomonas aeruginosa*. This bacterium is normally only responsible for infections in hospitalized patients and had proved particularly difficult to treat. Although penicillins are extremely safe, patients can occasionally develop an immune reaction to them and become allergic. In such cases the availability of alternative antibiotics is critical.

A third category of penicillins encompass ampicillin, amoxicillin and bacampicillin. Their activity is extended to include *H. influenzae*, *E. coli*, and *P. mirabilis* which are not covered by the aforementioned categories.

**Cephalosporins:** Cephalosporins were initially isolated in 1948 when crude cultures of *Cephalosporium acremonium* was found to inhibit the in vitro growth of *Staph aureus* and to cure typhoid fever in humans. Once the antimicrobial compound was isolated, it became possible to produce synthetic compounds with activity much greater than the prototype substance.

The cephalosporin structure contains the basic beta-lactam ring and allows for more gram negative activity than the penicillins and aminocillins. Substitutions at the "R" sites allows for variation in the spectrum of activity and duration of antibiotic action.

Cephalosporins are grouped into three "generations" by their antimicrobial properties. The first cephalosporins were designated first-generation while later, more extended spectrum cephalosporins were classified as second generation cephalosporins. In addition to the current generations of cephalosporins, a fourth has been proposed.



Significantly, each newer generation of cephalosporins has greater gram negative antimicrobial properties than the preceding generation. Successive generations follow a trend of increased dosing frequencies and palatability. However, total daily doses remain fairly constant. Most second- and third-generation cephalosporins haven't been approved for use in patients less than six months of age

First-generation cephalosporins have activity against staphylococcus and streptococcus, along with Proteus, E. coli, and Klebsiella. Second-generation cephalosporins broaden the spectrum, including activity against H. influenza, while the third generations have greatly expanded gram negative coverage. First-generation cephalosporins are useful in treating skin and urinary infections; later generations are useful against systemic and respiratory infections

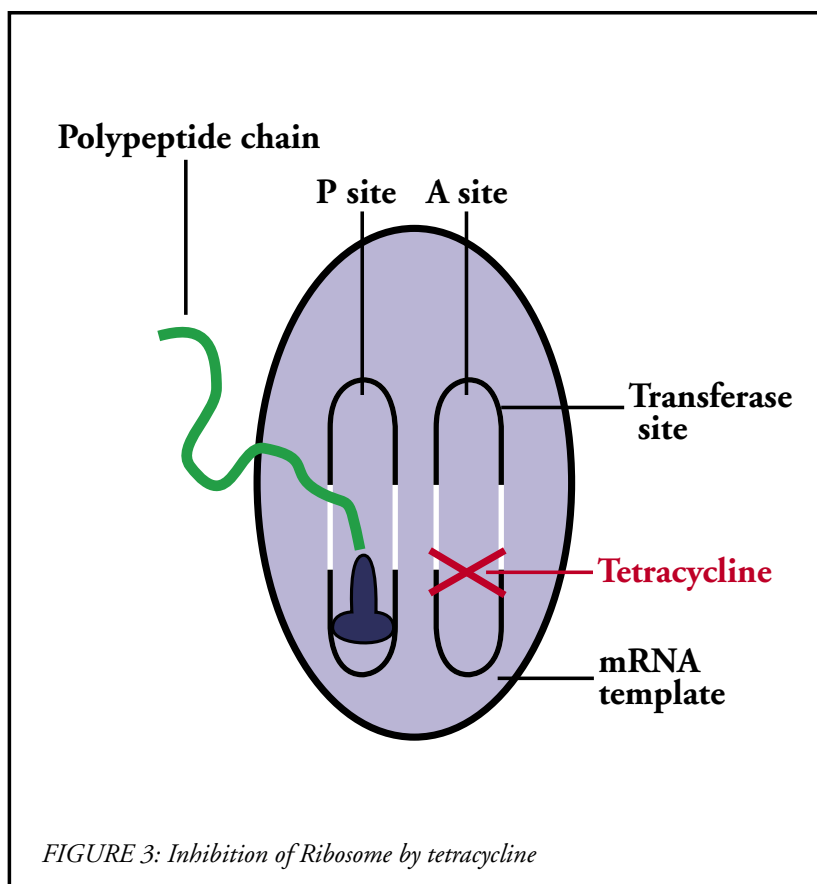
A fourth-generation cephalosporin is currently under development. These antimicrobials are projected to have an extended spectrum of activity for gram negative and gram positive organisms, minimal beta-lactamase activity due to rapid periplasmic penetration and high penicillin-binding protein (PBP) access, and a spectrum of activity which includes gram negative organisms with multiple drug resistance patterns (such as Enterobacter and Klebsiella). Cefepime (Maxipime) is one of these fourth generation cephalosporins. It is currently available in an injectable form for use in adults and children over 12 years old.

#### *Non Beta-Lactam Antibiotics*

Modern manifestations of respiratory diseases have brought a renewed interest to this class of antibiotics. Beta-lactam compounds are unable to concentrate in alveolar macrophages and there is a dramatically increased incidence of beta-lactamase producing pathogens. Vari-

**TABLE 3: NON-BETA-LACTAM ANTIBIOTICS**

- *Aminoglycosides*
- *Quinolones*
- *Sulfonamides*
- *Macrolides*
- *Tetracyclines*



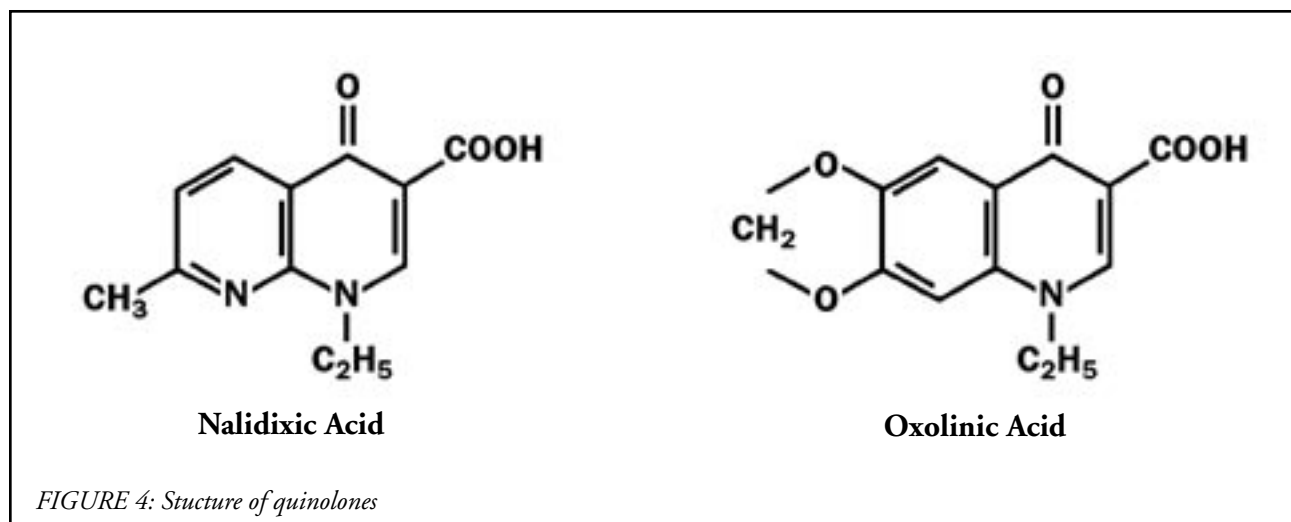
ous other antimicrobials must thus come to the rescue.

The non beta-lactam antibiotics can be classed into five families (*Table 3*). Each has an independent structure and activity against certain pathogens.

**Aminoglycosides:** This group of compounds was initially discovered in the form of Streptomycin shortly after penicillin was released to the public. In 1944, Waksman was the first to show that the compound inhibits tubercle bacillus along with various gram-negative and gram-positive microorganisms. Aminoglycosides are used primarily in gram-negative aerobic bacteria and are potent inhibitors of protein synthesis. As their name implies, aminoglycosides contain amino sugars glycosidically linked to an aminocyclitol ring.

In addition to Streptomycin and Kanamycin, both derivatives of similar molds, the aminoglycosides include gentamicin, netilmicin and neomycin. The group inhibits protein synthesis by binding to prokaryotic ribosomal RNA at the site of the ribosomal decoding region (Alper, 98). This disrupts translation at the ribosome level and accounts for the rapid bacteriocidal effect of aminoglycosides.

Aminoglycosides diffuse through bacterial cell membranes through channels formed by porin proteins. Retarding this permeation is one way in which bacteria may become resistant to aminoglycosides. Resistance can



also develop due to inactivation of the drug by bacterial enzymes or low affinity of the drug for ribosomal RNA. (Bryan 1988) The latter two processes are much more important clinically and may be overcome by combined administration with penicillin (Goodman).

**Sulfonamides:** This class of drugs was the first to be an effective chemotherapeutic agent in the prevention and cure of bacterial infections in humans. They were developed in the 1930s by German and English investigators. After the introduction of penicillin and subsequent antimicrobial agents, the usefulness of sulfonamides diminished and they now occupy a relatively small portion of a physician's antibiotic arsenal.

The sulfonamides are derivatives of para-aminobenzenesulfonamide and all have some resemblance to Para-aminobenzoic acid (PABA), the bacterial precursor of folic acid. Their mechanism of action is a competitive antagonism of PABA, preventing normal synthesis of folic acid. More specifically, the drugs inhibit dihydropteroate synthase, the enzyme responsible for folic acid synthesis. This mechanism limits sulfonamides to bacteriostatic action, and resistance develops commonly through mutations in dihydropteroate synthase, rendering sulfonamides useless. These mutations are generally persistent and irreversible (Triglia, 97).

The sulfonamides may be classified into three groups on the basis of the quickness with which they are absorbed and excreted. The first group, sulfasoxazole and sulfadiazene, are absorbed and excreted very rapidly. The second group, such as sulfasalazine, are absorbed very poorly and are thus active in the lumen of the intestines. Sulfacetamide, mafedine, and silver sulfadiazine are employed mainly for topical use and are members of a third group. The fourth group, which includes long-acting sulfadoxone, are absorbed rapidly but excreted slowly.

**Tetracyclines:** After the advent of penicillin, micro-

biologists throughout the world systematically screened soil samples in the hope of discovering more antimicrobial agents. Chlortetracycline, the first of the tetracycline family, was discovered as a result of such investigations in 1948. Several tetracyclines have been developed since which have a broad range of activity against gram positive and gram negative bacteria of the aerobic and anaerobic variety.

Like aminoglycosides, the tetracyclines are thought to inhibit bacterial synthesis of proteins. They do so, however, by binding to the 30S ribosomal subunit, preventing access of transfer RNA to the acceptor site on the mRNA-ribosome complex (Goodman). They are effective against several bacteria which are resistant to the cell-wall-active antibiotics such as *Rickettsia*, *Mycoplasma pneumoniae*, *Chlamydia*, *Legionella*, and some atypical mycobacteria. In addition to their antibacterial action, researchers now contend that tetracyclines might be of assistance in the treatment of arthritis, osteoporosis, and cancer, which are all characterized by the overproduction of tissue-degrading enzymes. Tetracyclines can inhibit the activity of these enzymes that break down connective tissue and bone (JADA, 97).

There are nearly a dozen modifications of the tetracycline molecule available as antibiotics. The agents available in the United States include tetracycline, oxytetracycline, demeclocycline, doxycycline, minocycline, and chlortetracycline. As they are all similar, they are all effective against a broad range of bacteria and when a microorganism becomes resistant to one tetracycline, it usually exhibits resistance to all of the others.

**Quinolones:** The earlier quinolones, developed in the early 1960s, consisted of nalidixic acid and its derivatives (see Figure 4). These drugs are of small significance now due to their poor pharmacokinetic activity and the rapid development of bacterial resistance. Later quinolones were based on oxilinic acid, a compound similar to

nalidixic acid, only less nitrogenous. More recently, the development of fluoridated versions of quinolones have come onto the scene. These agents, which will be discussed at length later, have improved therapeutic value, fewer side effects and less occurrence of microbial resistance.

The antimicrobial activity of the quinolones is based on their ability to inhibit DNA gyrase. DNA gyrase is a bacterial enzyme which prevents excessive supercoiling as DNA strands are separated during replication and transcription. The enzyme is not found in eukaryotes and mutations on the gene that encode the enzyme can occur resulting in resistance to quinolones and related agents.

**Macrolides:** In the early 1950s, researchers discovered a strain of *Streptomyces erythrus* that produced a potent antimicrobial substance. That substance, later named erythromycin, became the first of the macrolide class of antibiotics. Clairithromycin and Azithromycin, two semi-synthetic derivatives of erythromycin have since become popular. These orally active agents are all chemically similar, differing only in methyl substitutions within the lactone ring.

Renewed interest in the macrolides is due to the recent uprising in infections due to *Legionella*, *Mycoplasma* and *Chlamydia*. This class of antibiotics inhibits bacterial protein synthesis by binding reversibly to the 50S subunit of the prokaryotic ribosome. Though bacteriocidal at high levels, the macrolides are usually bacteriostatic against aerobic gram negative cocci and bacilli. It is generally believed that the macrolides inhibit the translocation step of translation rather than peptide bond formation (*Figure 5, next page*).

Resistance to macrolide antibiotics can occur with chromosomal mutations on DNA encoding the larger ribosomal subunit. Some micro-organisms may also produce esterase enzymes which inactivate macrolides and certain species of *Staph epidermidis* have developed alterations on the cell membrane which decrease its permeability to the macrolides.

In addition to the three infectious organisms mentioned above, the macrolides are also useful against *H. pylori*, Diphtheria, Pertussis, Tetanus, and several sexually transmitted diseases. The treatment of gastroenteritis caused by *Campylobacter jejuni* has also been successfully treated with macrolide antibiotics (Hoshino K, et al, 1998). Further uses for macrolides, especially azithromycin and clarithromycin are currently under investigation. Research suggests that macrolides improve clinical symptoms in adult AIDS patients and dramatically reduce infections by mycobacterium. The newer macrolides may effectively eradicate *H. pylori* related ulcers and make a dent in gastritis caused by the campylobactor species (Tarlow MJ 1997)

#### THE SEVEN NEW ANTIBIOTIC CLASSES

Due to the increasing prevalence of bacterial resistance to antimicrobial agents, medical research has continued to develop more effective antibiotics. The past decade has seen the introduction of a number of new potent antimicrobial agents, including broad-spectrum beta-lactam compounds such as third-generation cephalosporins, carbapenems, and monobactams; thienamycins, combinations of penicillins with inhibitors of beta-lactamase, and fluoroquinolones are also examples.

The seven "new" categories of antibiotics (see *Table 2*) do not differ widely from our arsenal of the past 30 years. They are primarily synthetic and significantly more effective in fighting bacteria. They are classed according to molecular structure and mechanism of antibiotic action. The first six mentioned in the figure are beta-lactam derivatives; the last one is a non-beta-lactam.

**Augmented penicillins:** Three molecules which are modifications of the penicillin have been developed. These compounds, developed to counteract the beta-lactamase enzyme produce by penicillin-resistant microbes, are beta-lactamase inhibitors; they bind beta-lactamase, allowing antibiotics to fulfill their purpose in the organism.

Clavulanic acid is a "suicide inhibitor" of beta-lactamase and is administered in conjunction with amoxicillin in an oral form called Augmentin. When the combination is given parenterally, it is called Timentin. Sulbactam and Tazobactam are two other beta-lactamase inhibitors. Both may be administered orally or parenterally with other beta-lactam antibiotics. The augmented penicillins are not effective against all penicillin-resistant bacteria.

**Carbapenems and Thienamycins:** These two groups deserve discussion together due to their chemical and antibiotic similarities. Both classes are beta-lactam compounds which disrupt cell wall synthesis and have high activity against streptococci, enterococci, staphylococci, and *Listeria*. Currently available carbapenems cannot be administered orally. The carbapenems can overcome resistance to many of the earlier beta-lactam drugs.

Carbapenems include Imipenem, which is also a thienamycin, and Meropenem. Imipenem is the most active agent currently available against many bacteria. It is marketed with cilastatin, a compound which inhibits imipenem degradation. The two are used together clinically against infections of the urinary and lower respiratory tracts (goodman). Meropenem has not received wide clinical attention. New carbapenems with increased activity against resistant microbes are currently under development, as are several with oral activity.

Imipenem differs chemically from penicillins and cephalosporins but has a similar mode of action. It is a potent antibacterial agent with a broad spectrum of activ-

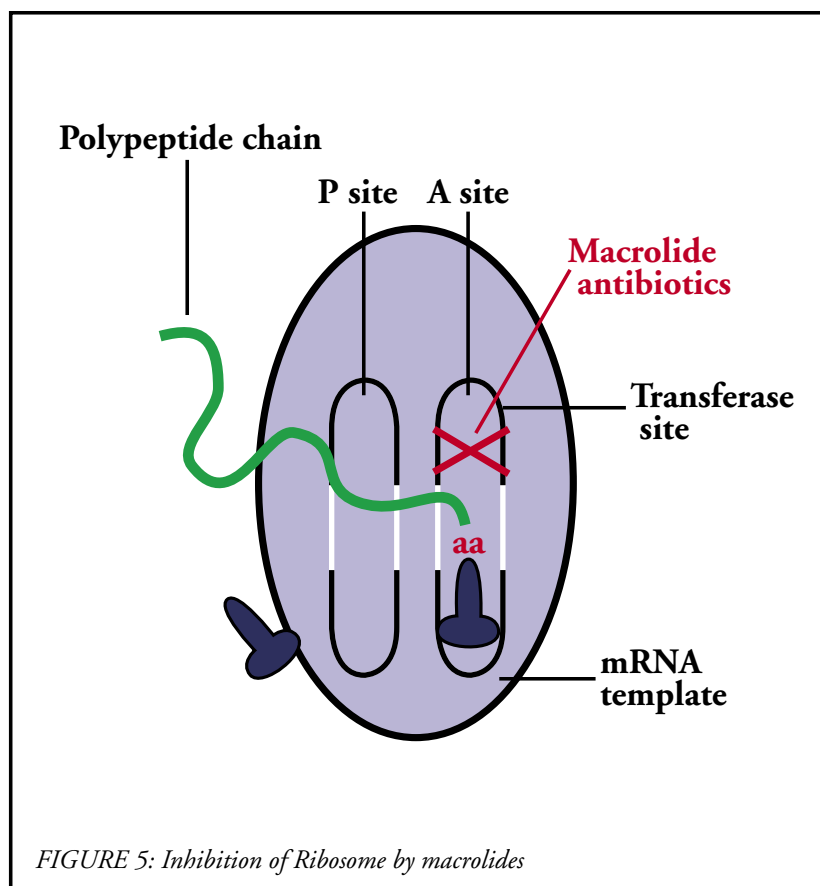


FIGURE 5: Inhibition of Ribosome by macrolides

ity encompassing both aerobes and anaerobes. It does not, however, offer a great improvement over other available agents for the treatment of infections caused by problem organisms such as *Pseudomonas aeruginosa*, methicillin-resistant *Staphylococcus aureus* and enterococci. The results of clinical trials suggest that imipenem is efficacious and toxic side effects do not appear to be a problem (Williams 86).

**Carbacephams:** Research still required.

**Monobactams:** The monobactams display similar activity to carbapenems. When compared to other beta-lactams, certain species of monobactams display more activity against many species of the family Enterobacteriaceae (Fung 1997). Synergy between the monobactams and beta-lactamase-labile antibiotics were observed when such combinations were tested against strains of Enterobacteriaceae that produce large amounts of beta-lactamases (heinz).

The monobactams, which include tigemonam and aztreonam, have higher activity against gram negative species of bacteria than amoxicillin/clavulanic acid, aztreonam, and the third generation cephalosporins (Rylander, 88). Aztreonam exhibits effects more similar to aminoglycosides and appears to be effective in patients allergic to the penicillins.

**Fluoroquinolones:** As discussed previously, the fluoro-

quinolones are simply a fluoridated version of the quinolone molecule. These compounds, which include ciprofloxacin (cipro) and ofloxacin (Floxin), are as well tolerated as the quinolones but possess a much broader range of antimicrobial activity. A further advantage is that resistance does not occur readily against fluoroquinolones.

The fluoroquinolones are primarily useful against bacteria infecting the intestinal tract. These microorganisms include *E. coli* and various strains of *Salmonella*, *Shigella*, *Enterobacter*, *Campylobacter*, and *Neisseria*. (sanders, 88) Again, the mechanism of action for all quinolones is inhibition of DNA gyrase, a bacterial enzyme required for bacterial growth and proliferation.

A recently developed fluoroquinolone called Gatifloxacin has activity more potent than those of all other fluoroquinolones, against mutant strains of certain bacteria. This suggests that gatifloxacin possesses the most potent inhibitory activity, among the quinolones, against mutated DNA gyrase

which causes bacterial resistance. Gatifloxacin displays good activity against quinolone-resistant clinical isolates of *Staph aureus* harboring resistance-causing mutations (Fukuda).

#### BACTERIAL RESISTANCE

Bacteria become resistant to individual antibiotics through the development of specific defense mechanisms which render the antibiotic ineffective. Not all bacteria develop the same types of resistance. Generally, bacteria may become resistant to an antibiotic by utilizing one of three mechanisms: (1) Prevent the antibiotic from binding with and entering the organism at the cell wall or cell membrane level, (2) Produce an enzyme that inactivates the antibiotic (beta-lactamase enzymes in the case of bacteria resistant to penicillin, *H. influenza* and *M. catarrhalis*), and (3) Change the internal binding site of the antibiotic.

An example of the second type of resistance is the infamous beta-lactamase enzymes. There are actually dozens of enzymes, produced by many different bacteria, which are capable of degrading the beta-lactam structured antibiotics. Unfortunately, this form of antibiotic resistance can be transmitted to other bacteria. Perhaps even more significant is the emergence of penicillin resistant pneumococci (PRP). Since the late 1980's, PRP have been

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**STEPS TO TAKE TO ELIMINATE RESISTANCE**


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- *Wash your hands*
  - *Immunize*
  - *Stress compliance*
  - *Educate and stay educated*
  - *Know local resistance patterns*
  - *Don't treat viral infections with antibiotics*
  - *Use the most appropriate spectrum antibiotic for each infection (avoid "over-kill")*
  - *Limit antimicrobial prophylaxis if possible*
  - *Shorten the duration of antibiotic treatment if possible*
- 

*Leiberman, J.M., 1994*

reported with increasing frequency (over 20% in 1994). Unfortunately, many of the PRP are also resistant to other beta-lactam antibiotics, as well as sulfas. Thus, antibiotic resistance can be spread among bacteria.

The clinician plays a significant role in reducing the problem of antimicrobial resistance. Viral illness should not be treated with antibiotics and patients should be educated on compliance issues and use and misuse of antibiotics. It is crucial to stress patient compliance with timing and duration of antibiotic treatment. It is further important to prescribe the most appropriate antibiotic for each infection, avoiding overkill and prolonging the development of resistance to more powerful antibiotics.

#### CONCLUSIONS

Dealing with microbial infections is an integral part of clinical practice. The vast number of antimicrobial agents available, including those new ones which are constantly being introduced, requires clinicians to keep abreast of the properties, antimicrobial activities, clinical uses and possible adverse effects of these agents. This article was simply an overview of the evolution of several classes of antimicrobial agents commonly used in daily practice, with the goal of leading medical clinicians toward rational and judicious usage of these potent medications.

Bacterial infections have plagued mankind for millennia. The future will likely introduce bacterial illnesses for which we do not currently have a cure. Antibiotic development is a race against deadly microorganisms, for which we must constantly prepare more diligently and slow our bacterial opponent as effectively as possible.

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# PREPARING FOR DISASTERS

Are you & your family ready for a fire, earthquake, mudslide, hurricane, tornado, flood, drought, famine — or Y2K disruption?

*by* Glen C. Griffin, M.D.





Suppose that an hour after you go to bed tonight, you're awakened by your bed shaking and a frightening noise that sounds like a thundering locomotive and the sounds of cracking glass, wood, and brick?

Many of us live on or near fault lines. Others live in mudslide, flood, tornado, or hurricane country. Fire and lightning can be a major danger wherever we happen to be. Whether caused by carelessness, electrical shorts, or lightning, fire may be the most common disaster most of us is likely to face. But flooding is also a big risk — causing considerable destruction and disruption.

Even though many of us have experienced one or more major disasters, few of us have personally experienced the long lasting effects of such a disaster or a widespread famine. The simple fact is that it's easier to put thoughts of disasters out of our minds than it is to think about them.

However, we've been told since childhood to be prepared. One prophet after another has warned and reminded us. President Gordon B. Hinckley gave us a strong wake-up call in the October 1998 General Priesthood meeting — recounting the scriptural account of Pharaoh's dream of the seven fat-kine. Even though he explained that he wasn't giving a prophesy, most who heard him realized what he was saying shouldn't be taken lightly.

The prophet's recent words give us good reason to size up the status of our preparedness. We've been taught and coached well about having a year's supply. Unfortunately, there's been such an emphasis on instructions about 72-hour kits that many feel prepared if they have a milk carton containing Band-aids, an MRE (a canned military meal), and whatever.

Don't get me wrong. I'm a big believer in being prepared. I'm just concerned that there's been a little more emphasis on 72-hour kits than on instructions to have a full year's supply of food and other essentials.

How prepared would you be if a severe earthquake happened tonight — or if there were some other severe disruption to the source of food — a strike, a terrible draught, or computer glitches as we enter a new century?

A neighbor who lived in Germany through terrible shortages during World War II knows first hand about hunger and famine. She has been and continues to be dedicated in growing as much food as she can and having a plentiful supply of food and water.

And think of those in your circle of friends, and relatives who have found their source of income cut off for

one reason or another. Those of us with medical training may feel secure about always having work. But what about our parents and grown children? And even for us, life doesn't come with many guarantees. Who knows what may happen that could take away or limit our ability to bring in an income?

Being prepared is important, but this means more than having a ton or so of wheat and a few extra cases of canned food.

### **Hurricanes**

A hurricane is a tropical storm with winds at least 74 miles per hour, and often with even much more force, traveling in a spiral around an eye 20-30 miles or more wide sometimes reaching some 400 miles in width. As a hurricane approaches, the skies begin to darken and the winds grow in strength.

In 1998 several hurricanes churned around the Atlantic — with Hurricane Georges killing hundreds, flooding and destroying homes, smashing ships, and knocking out power to hundreds of thousands of people. Twenty to thirty inches of rain fell in some places. Millions were evacuated from their homes with extensive damage in Central America, in the Caribbean, and on the gulf coast of the United States.

Several years ago a hurricane hit Charlotte, North Carolina when I was there to give a talk. Since Charlotte is inland, no one expected the full blast of the hurricane to hit — especially me. Long after I had gone to sleep the phone rang in my hotel room. I was told to evacuate to the ground floor. But since sleeping on the hotel lobby floor didn't sound like a good place to spend the night, I looked out the window to see what was going on. Even though the rain was horizontal, there didn't seem to be any immediate danger, so instead of following instructions, I watched reports of the hurricane on television and went back to sleep. In the morning as I walked down the stairs, I complimented myself about not having spent night a on the floor in pajamas as hundreds of others had done.

Then I went outside and walked around the block. Giant trees had been snapped off at their bases. The streets were filled with glass from shattered windows and debris. I had not been very smart. Previously I had been critical

of stubborn people who rode out hurricanes — and at that moment I realized I had foolishly been one of them. If there is a next time, I'll leave when told.

## Tornadoes

A tornado is violent swirling wind with wind speeds approaching 300 miles per hour. We usually think of a tornado as being a funnel that can be seen as well as heard — but sometimes a tornado is nearly invisible except for the swirling debris at its base. Tornadoes are the most destructive when they touch ground — and usually don't stay on the ground for more than 20 minutes. Strangely, tornadoes in Florida usually touch down only for moments or minutes at a time — so there is little or no warning.

A tornado is produced when cool air overrides a layer of warm air, forcing the warm air to rise rapidly. Tornadoes occur throughout the world, but the most intense and devastating tornadoes are in the United States. Be alert for a tornado during any thunderstorm — especially if there is large hail, very still calmness before a storm, a cloud of debris, a funnel cloud, or a roaring noise.

I once unwisely tried to outrun a tornado in a car. Fortunately we were successful. But, trying to outrun a tornado is dangerous because it can quickly change direction and is powerful enough to pick up a car or truck and throw it through the air. So if you are driving in the vicinity of a tornado, stop, and get inside a building

In the midwest, the weather bureau is very accurate in tracking and providing watches & warnings about tornadoes — and it's prudent to watch trackings of tornadoes on television during any storm.

Since tornadoes are life threatening, it's important to get inside — and then to the basement if there is one. If there isn't a basement, get in an inner closet or a small room with no windows. If this isn't possible, at least get away from windows, to the center of a room and under the sturdiest piece of furniture you can find — using your arms and hands to protect your head.

## Flash Floods

A flash flood results from an intense storm dropping large amounts of rain in a short time. In Minnesota we witnessed 12 inches of water fell within one 24-hour period. The freeways were like rivers and cars were buried in underground parking terraces.

If you are in a building during a flash flood, use large corks or stoppers to plug showers, tubs and basins to keep sewage from backing up. Hopefully you will already have reserve supplies of clean water, but if you don't, fill tubs, containers, jugs with clean water in case the water becomes contaminated. Of course utilities and gas should be shut off at their points of entry. And if water should fill or partially fill basements, it's suggested to pump one third of the water out each day to reduce the amount of structural damage that occurs.

## Lightning

Lightning can be an awesome nighttime show. But lightning causes more deaths & destruction each year than all the hurricanes, tornadoes and floods combined.

Lightning is a sudden electrical discharge that is the result of a build-up of positive and negative charges from cloud to cloud or from cloud to ground. A lightning strike can contain 100 million volts. And the heat can reach 50,000 degrees F. The hot flash of heat cooks the air, expanding and pushing away the cold air causing thunder. An estimate of how close a lightning strike is in miles can be made by counting the seconds between the light-

ning flash and the thunder and dividing by five.

It was two minutes past 11 p.m. when my wife saw lightning come through our window along with the loudest thunder we've ever heard.

Fortunately the main power system surge protectors saved our computer and video theater equipment, but a phone was destroyed and an electrical circuit was knocked out. An accompanying strike fried three television sets in a house across the street and hit the satellite at the home of another neighbor causing other electrical damage.

The most intense strike in that series hit a weather vane that was on the top of another neighbor's home, smashing large holes in the roof and shattering the sheetrock under it. Sprays of giant sparks showered the house with flames shooting high in the air before hard rain put out the fire. Power outlets were burned and a computer was so damaged that it didn't even recognize its own mouse.

As I ran across the road I was afraid one of our friends had been electrocuted and that my CPR efforts wouldn't be sufficient. Fortunately no one was injured and rain put out the fire by the time the fire engines and paramedics arrived.

Even though many of us have experienced one or more major disasters, the simple fact is that it's easier to put thoughts of disasters out of our minds than it is to think about them.

A person who is hit by lightning is not electrically charged, so you can do CPR. You are safest in a closed car during lightning because the car acts as a Faraday cage — the charges repelling to the outer surface.

That night as I surveyed the damage to the home of our friends, I wondered what had happened to the idea of lightning rods. Are homes today adequately protected by well-grounded electrical systems?

According to State Farm Insurance and the non-profit, Lightning Protection Institute, and all but one source I found on the Internet, the answer is no. To be safe, our homes should be equipped with a lightning rod well grounded with a pair of metal ground rods that go down at least 10 feet

With all the electronics we have on our homes and workplaces, it is wise to have main power box surge protectors as well as individual surge protectors on outlets to our computers and other valuable electronic equipment. By the way, there are 100,000 thunderstorms in the United States each year while there are about 1,000 tornadoes.

## Earthquakes

On arriving in Guatemala a few days after the disastrous 1976 earthquake, I didn't know what to expect — even though I had been sent by the Church to assess the situation and to provide needed medical assistance along with helping coordinate the efforts of the health-service missionaries who were already assigned there. As we landed we could see many shattered windows at the airport terminal. Then as we drove along we could see some wide cracks across the roads — but there were no gigantic holes in the earth sucking everything and everyone in them. The most striking thing that the shaking earth did was to dislodge buildings — sending adobe walls, massive rocks, bricks, or heavy beams toward the earth crushing people, furniture, lifetime treasures, cars, or whatever was in their path.

The visible damage to some of large buildings in Guatemala City was impressive. And even when a building looked intact from the outside, it often wasn't. The phone lines in the headquarters of Guatel, the Guatemalan Telephone Company were so severely damaged that cables were strung to operators in a school bus out in front — where all the nation's international phone were handled for some time after the earthquake. It was quite an experience to line up at the school bus and to have a telephone receiver hung out the window while I called back to Church headquarters in Salt Lake to report. When one's

time was up the operator pulled the phone back up into the bus.

But as terrible as the damage was in the capitol city, words can't describe the devastation that I saw in the Guatemalan highland towns of Chimaltenango and Patzicia where most of the small adobe houses had crumbled to the ground — in many cases the heavy adobe bricks falling on and crushing children, mothers and fathers to death. The earth suddenly began to shake at 3:30 in the morning on January 4, 1976.

The adobe blocks tumbled down like Jenga-game blocks, dominos, or small toy blocks would fall if you got under the game table and shook it violently. Virtually every family in those highland villages lost loved ones. Others were severely injured. In other villages, it was even worse — in some cases almost everyone in the village were killed and buried in the rubble which is why

even yet no one still knows how many people were really killed in that earthquake. The number dead was probably more than 70,000 instead of a few thousand from what was thought to be a minor quake from a minor fault.

Almost everyone knows there are major earthquake fault lines along the coasts of California, from the Aleutians to Alaska, in Nevada — and in Utah where 75 % of the people live near the Wasatch Fault.

During the past 6000 years, a strong earthquake has occurred about every 350 years along this fault. A major earthquake on the Wasatch Fault will severely damage gas, electric, water, communication, and transportation lifelines, crippling these areas.

When an earthquake happens, quick decisions need to be made. If structural damage has occurred in a home that could cause breaks in electrical wiring, water pipes or gas lines, the main water valve, power, and gas should be turned off to avoid short circuits, fire, explosions, and other problems. Likewise, if gas can be smelled or heard to be leaking — or if there is a fire, the gas should be shut off at the meter. However, once it's turned off, it can only be turned back on by a gas company service person. which in such an emergency may take several days. For example after the 1989 San Francisco earthquake, 156,000 people rushed to turn off their gas mains when only 2% of them needed to have been shut off.

## Famines

If watching starving little kids in Somalia and other third world countries on television news and in newspa-

President Hinckley gave us  
a strong wake-up call in 1998  
General Conference with  
his recounting of Pharoah's  
dream of the seven fat kine.



Damage from earthquakes can bring down homes and large buildings alike. In major quakes, many can be left without shelter or food.



LDS Church volunteers helped distribute medical supplies after the 1976 Guatemala earthquake — a good reminder to have a family reserve of needed medications



Dried apples and other items can be stored in mylar bags, as is illustrated at this neighborhood dry-packing project. As the CO<sub>2</sub> goes in, oxygen and air go out, and the mylar bag is ready to seal.

per and magazine pictures were not enough, the accounts of modern day famines and the records of the famines in the times of Joseph should be — especially since President Hinckley reminded us about those seven years of famine that followed seven years of plenty. If we don't prepare, it will not be because we have been inadequately warned.

### What problems will Y2K bring us?

Will computers that don't know the difference between the year 2000 and the year 1900 cause total chaos and disruption in transport, distribution, inventory, and supply systems across our land? Will suppliers of food and other essential supplies and markets that usually sell them be unable to meet our needs? Will the supply of power we are so dependent on be disrupted? Will Internet, telephone, radio, and television communications be log jammed — or shut down? Will air and other transportation systems and schedules be upset? Will banks and world's financial markets be shaken? And what about the computers in your office, home, and hospital? Have you checked them out to be sure they are Y2K compliant? And how about medical equipment programmed with computer chips? It's certainly worth doing whatever you can do now to assure that on January 1, 2000 your patients will be safe, your billing and financial records will be intact, and that you have some contingencies in place in case power outages and supply shortages occur.

Many expect some disruption with Y2K, while others have almost no concern at all. Most experts warn that foreign banks, financial institutions, and air transport systems are the most vulnerable. Others are convinced a worst-case scenario may unfold throughout our country too. And concern about what may or may not happen could cause panic — with runs on banks and financial institutions and on markets and food suppliers. This panic could be one of the greatest upsets triggered by the Y2K glitch. Food and basic consumable commodities, including fuel, water, and medications could become scarce. Prices could rise, gradually at first — and then in larger increments.

### So, what should we do to be prepared?

Being prepared is something we have been taught to do — whenever possible, to have on hand a year's supply of food and other supplies and other commodities.

But what does this mean? "We are prepared," someone told me, "We've had a ton of wheat in our basement for years!"

"We don't ever use the wheat we've stored," others have admitted. Someone else said, "I just bought a load of beans, so we won't be hungry if there's an emergency — but I'm not going to eat this stuff unless I have to." Each of these people missed the point.

It's great to have plenty of wheat, but that's not enough. And when we think about President Hinckley's reminder about the scriptural account of the seven years of plenty followed by seven years of famine, there's no question that we should get serious about food storage. However, it's certainly not a good idea to buy food we don't plan to eat unless there should happen to be an earth-shattering disaster.

It's good to have a few cases of fruit, tomatoes, salsa, and perhaps some fish or a little meat in the freezer. But it's not practical to store a year's supply of what has become the "usual and customary" way of eating for many people — heavy on meat, pizza, fries, Fruit Loops, Twinkies, ice cream, and other expensive prepared foods. This would cost a fortune. Anyway, what have we been taught in the 89th section of the Doctrine and Covenants and from Daniel and his friends who chose "pulse" instead of "the king's meat?" These teachings about eating simple foods, especially wholesome grains, legumes, fruits, and vegetables, were given long before research produced current nutritional guidelines and medical reasons for eating wholesome foods with a minimum of bad trans-fats and saturated fats.

Eating "pulse" foods such as split peas, rice, whole wheat, oats, white beans, black turtle

beans, pinto beans, and black eye peas are what we should be eating all the time — not just in times of famine or other disasters. And this is exactly what we've tried to do — dry packing these basics along with dried onions, carrots, green peas, potato pearls, apple slices, dried milk, dried eggs, cocoa, pancake mix, fruit drink, corn flour, spaghetti, and puddings. Many of these products we obtained and packaged in Church dry pack canneries — in Minnesota and in Utah — first using number 10 cans and more recently in tough 12 x 12 mylar-packs that we seal with a foot pedaled direct-heat sealing machine some of us acquired when the regional Church canneries became so overscheduled. In a typical three-hour early morning session, a group of 6 to 11 of us can easily package 800 pounds or more of food.

Just before sealing each package of any of the powdered foods, we slip in a small oxygen-absorbing packet. However instead of using the oxygen-absorbing pack in

There are over 100,000 thunderstorms each year in the U.S. — and most experts agree that our homes are not adequately protected from lightning.

**SHADRACH, MESHACH & ABEDNEGO STEW**

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|                        |                         |
|------------------------|-------------------------|
| ¼ CUP WHOLE WHEAT      | ½ CUP POTATO PEARLS     |
| ¼ CUP PINTO BEANS      | ½ CUP DRIED ONIONS      |
| ¼ CUP PINK BEANS       | 2 QUARTS WATER          |
| ¼ CUP WHITE BEANS      | 1 TSP COURSE PEPPER     |
| ¼ CUP DRIED CARROTS    | 1-1½ TSP SALT           |
| ¼ CUP DRIED GREEN PEAS | 1 CAN DICED TOMATOES    |
| ¼ CUP SPLIT PEAS       | ¼ TSP TABASCO HOT SAUCE |

Add the beans, whole wheat, green peas, split peas, and carrots to 2 quarts of water and bring to a boil for two minutes. Turn off the heat, cover and let sit for 2 hours. Then turn the burner back on and simmer for an hour. Add the onions and simmer another hour or so till the dried foods are soft, adding water as needed while keeping a thick stew, stirring to avoid sticking. Add a cup of hot water to ½ cup potato pearls, beat with a hand mixer and add to the big pot and stir in. Add the diced tomatoes with salt, pepper, and Tabasco sauce, stirring for a few more minutes. Serve hot. Enjoy.

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**SAMUEL-THE-LAMANITE'S BLACK-BEAN SOUP**

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|   |                             |
|---|-----------------------------|
| 2 CUPS BLACK TURTLE BEANS                 | 4 OZ CAN DICED GREEN CHILES |
| 2 QUARTS WATER                            | 1 TSP COURSE BLACK PEPPER   |
| 4 TSP CHICKEN (OR BEEF) BOUILLON GRANULES | 1 TO 1 ½ TSP SALT           |
| ½ CUP DRIED ONIONS                        | ¼ TSP TABASCO HOT SAUCE     |

Add the black beans to 2 quarts of water and bring to a boil for two minutes. Cover and let sit for 2 hours. Turn the burner back on and simmer for an hour. Then add the onions, bouillon granules, and a water as needed from time to time, keeping the soup thick. Add the salt, pepper, and hot sauce and continue simmering until the beans are tender which may take another hour or two. Stir in the chile peppers and put the mixture in a blender or food processor just long enough on a slow speed to create an almost smooth soup, adding a little hot water if the mixture is too thick. Reheat and serve hot, plain, or topped with a scoop of low fat cottage cheese.

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NOTE: There is no documentation whatsoever that this recipe was a regular menu item at the home of Samuel-the-Lamanite. And if Samuel's wife did prepare this soup for their family, we recognize that they didn't have an electric blender to make the soup texture smooth. However, since he probably had access to black beans, we thought it appropriate to recognize him by giving this great soup his name at the same time we recognize Shadrach, Meshach & Abednego by naming our pulse soup after them.

foods like beans, rice, spaghetti, apples, carrots, onions, and other bulkier dried foods, we shoot in several squirts of CO<sub>2</sub> through a 15-inch copper tube with a trigger valve that delivers CO<sub>2</sub> from a hose coming from the regulating valve on a portable CO<sub>2</sub> tank. The CO<sub>2</sub> pushes out the oxygen and kills any creatures that might be present. It's less expensive than oxygen absorbing packets and is easier to handle. And even though 5 or 6 oxygen-absorbing pouches can be put in a 5-gallon bucket of wheat or beans, the CO<sub>2</sub> does the job and is less expensive.

If your experience with wheat is limited to hard red turkey wheat, you may want to try a new hybrid variety of hard white wheat that makes lighter bread, pizza dough, and other things which are more tasty, easier to digest. This white hybrid wheat is not the soft white wheat milled for bakeries that doesn't store well. Three of the easier-to-digest varieties of hard white wheat that do store well are Montana Spring Wheat, Golden 86 White Wheat, and Classic White Wheat. So even though we have lots of red turkey wheat, we've now added several hundred pounds of white wheat to use for bread and baking, limiting our use of red wheat to stews and other things that require

small amounts.

By buying dry food in 25, 50, or 100-pound quantities, money can be saved while eating better and healthier. The key is to set up a system so these dried foods can be used. We have a #10 can on a kitchen shelf closed with a plastic lid for each kind of dry food we have in storage so we can be using our food supplies as we go along. Then when that can is empty it is refilled with the contents of one of our stored mylar bags.

This is the key — choose a good variety of wholesome “pulse” foods, package a good reserve for times of special need, but be using them along the way — every day or so. The dried apple slices available at the Church dry pack canneries are the same ones used in the best restaurants and bakeries for pies. And the new potato pearls are far better than the dried potatoes you may have come to dislike. These new potatoes come pre-flavored with a small amount of Canola oil and make delicious and instant mashed potatoes or potato soup. Find recipes your family can regularly prepare and enjoy from your food reserves such as Shadrach, Meshach & Abednego Stew and Samuel the Lamanite Black Bean Soup (*above*).



## Water

One of the main things that became clear to me in the aftermath of the Guatemala earthquake was the urgent need for clean water. It was no surprise that illnesses became rampant when people used filthy contaminated water. Even when we distributed pots it was difficult to get people to boil the water they used. Bruce Woolley has coached missionaries and many of us that in third world conditions we should at least filter floaties out the water through paper coffee filters and then boil the clear water for 3 minutes. If there is no way to boil the water, add 4 drops of fresh bleach (5.25% sodium hypochlorite) to a quart of room temperature water. If after 30 minutes it still has a chlorine odor, it's probably safe to drink. If chlorine odor isn't present, add another 4 drops and wait another 15 minutes. If there still isn't an odor of chlorine, it may mean the bleach was too weak to do any good.

And even though most of us have never experienced a real drought, that could happen too.

So having a reserve of clean water is an important part of being prepared. How much? It isn't possible for most people to store enough water to last for a long time, so store what you can. For space considerations, 55 gallon barrels may be convenient — but remember that once a big drum is filled, it can't be moved like rearranging furniture. For this reason a good alternative is to store a large number of 5-gallon plastic water jugs filled with clean water after rinsing the jugs with a bleach solution.

## Fuel

What about fuel and power?

After being dependent on electricity and gas for cooking, heating, light, and countless other amenities, losing readily available power and fuel would be very disruptive. At the very least, every family should have a back up way to cook and to provide heat when it's cold. This might be a good supply of firewood. Or it might be three or four 5-gallon propane tanks — and a camp cook-top or adapters for a kitchen cook-top, keeping in mind there are differences between propane and natural gas.

If a generator is to be relied on for power, one that runs on propane is better than one that runs on gasoline because gasoline stores poorly and is a big hazard.

But is the Y2K problem this much of a concern? Probably not. There may be some short term disruptive power outages — and if there's no power, this may also stop the flow of natural gas, which has to be pumped. But being prepared goes far beyond Y2K.

So whatever you do or don't do about propane or generators, be sure to have some way to cook and don't forget matches, batteries, flashlights, and candles — and a good supply of soap, sanitary supplies, and toilet paper.

## Medications

While thinking about needs for emergencies, be sure to remember the medical needs for your family — as well as advice for your patients and friends. Think what it would be like if supplies of insulin, heart medications, anti-hypertensives, and other ongoing needed prescriptions were not available. And with the high costs of prescription medications, having much of a reserve supply of medications is very difficult. In today's era of managed care, prescriptions covered by most insurance plans are limited to 30-day supply. Few people can afford to have a year's supply of prescription medications. But, it may be possible to get a few month's supply of a generic medication or a similar substitute. It's also wise to have a

year's supply of aspirin, acetaminophen, Pepto Bismol, antihistamines, Ifobuffren, cortisone cream, and possibly a supply of generic antibiotics. As we build our supply of medications, we're sealing them like we do dry food with CO2 in mylar packets to extend their life — even though most of them will be used and rotated. To make these packets a more useable size for medications, we've been making four small mylar bags out of each large one by two cuts on a paper cutter and sealing the cut edges with our sealer.

## Just do it

Being prepared is the right thing to do, at all times — not just because we are looking ahead to a one-time phenomenon when computer software programs may mishandle the change from 99 to 00 and throw things into turmoil. This may or may not happen to any great extent. If it doesn't, whatever preparations we have done wisely will be what we should have done anyway. And if absolutely nothing disruptive happens on January 1, 2000, we should go right on in the weeks, months, and years that follow, to prepare. We should continue to store, use, and rotate good basic, wholesome foods and supplies — including reserves of fuel and essential medications.

Being prepared is the right thing to do — not just because of Y2K, but for anything that could happen.

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