STROKE NOTES
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Preventing Heart Disease and Stroke in North Carolina

by Elizabeth Puckett

Elizabeth Puckett

Diseases of the heart and blood vessels, including stroke, are known collectively as Cardiovascular Disease (CVD). CVD claims more lives each year than the next seven leading causes of death combined. CVD is the leading killer of both men and women in all racial and ethnic groups in NC and in the nation. We have the sixteenth highest death rate in the nation for coronary heart disease and the fourth highest for stroke!

The story of heart disease and stroke and North Carolina's efforts to prevent them contains both good news and bad. While the death *rate* for CVD has declined, that decline has slowed in recent years and the *incidence* appears to be rising so that there are more people *living* with CVD. This is due both to the aging of the population and to the tremendous improvement that we have seen in the treatment of people with the underlying condition common to all CVD—atherosclerosis. Atherosclerosis or "hardening of the arteries" develops over a lifetime and can result in a number of conditions such as heart attack, stroke or brain attack, peripheral arterial disease (PAD) heart failure and kidney failure. There is also a growing body of evidence linking this underlying disease to dementia. The important thing to know is that much of this disease, disability and death is preventable, and that it is never too late to start preventing it.

Heart Disease is the most common form of CVD and accounts for more than 30% of all deaths in our state. It has been the leading cause of death for the last two decades and remains the major cause of premature death, or potentially productive years of life lost. Stroke is the third leading cause of death in NC (after all cancers combined) and the leading cause of severe, long-term disability in adults. North Carolina is a "Stroke Belt" state, with higher than average rates of stroke deaths than other parts of the country. The eastern part of NC has some of the highest stroke deaths in the nation and is known as the "buckle" of the Stroke Belt—for reasons that are either uninvestigated or unexplained. After decades of decline, the stroke death rate appears to be rising, especially for those over 65. High blood pressure—or hypertension—is the leading cause of stroke. African Americans in NC have higher rates of hypertension and approximately twice the risk of stroke compared to whites.

What are we doing about it?

In 1995 the General Assembly passed a bill establishing the NC Heart Disease and Stroke Prevention Task Force. The legislatively appointed and funded Task Force was the first of its kind in the country and many states are replicating this approach to preventing CVD. Charges to the Task Force were to:

- Develop a profile of the burden of CVD in NC
- Publicize that burden and its preventability
- Develop a comprehensive statewide plan to prevent it.

The 27 member Task Force has completed those charges, but remains in existence to oversee the implementation of the State Plan that was released in 1999, and is currently being updated for release in 2004. The Task Force receives state funding for an awareness campaign called "Strike Out Stroke"

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A Chapter of the National Stroke Association

Dave Iauco

Message from Board President

Welcome to the North Carolina Stroke Association's inaugural newsletter, ***Stroke Notes.*** This publication is designed specifically for stroke survivors and their caregivers, containing useful information about life after stroke as well as updates on the latest research on stroke prevention and therapy. But it should also be of interest to anyone who has an interest in learning more about stroke, its consequences, how to avoid a stroke and what is being done particularly in North Carolina to lower the high incidence of stroke.

The North Carolina Stroke Association was formed in Winston-Salem in 1998 by a group of concerned citizens who had an interest in doing more to address the problem of stroke in our state. Our mission is… ***To reduce the incidence and impact of stroke in NC through screening and education.*** Among a variety of programs we have designed a unique Stroke Risk Identification Program that is used to screen people in the community for risk factors and encourage them to seek treatment. We also have a Hospital Visitation Program for stroke survivors where we provide valuable information to aid in their transition to life after stroke. While we began our programs in Forsyth County and have recently branched to the eastern part of the state through collaboration with Pitt Memorial Hospital in Greenville, NC, we are dedicated to spreading our programs across the entire state of North Carolina.

Stroke is a major medical problem throughout the country with 700,000 Americans suffering strokes each year. It is the 3rd leading cause of death but the leading cause of serious, long term disability costing Americans about $51 billion for stroke-related medical costs last year. About 4 million Americans are stroke survivors. North Carolina is in the "Stroke Belt," and has the second highest incidence of strokes per capita in the nation. While the reason for this high level of stroke incidence is unknown, it is clear that by educating the public about the risk factors of stroke, screening the public to identify an individual's risk factors and encouraging proper follow-up medical treatment, this high stroke rate can be reduced. So the NC Stroke Association is focused on doing just that. We educate the public about stroke risk factors, stroke warning signs and the importance of calling 911 immediately when they are experienced. And we help stroke survivors by providing on-going education and information on coping after stroke.

We hope you enjoy this first issue of ***Stroke Notes.*** Don't forget to also visit our website at www.ncstroke.org for the latest information on North Carolina Stroke Association activities.

We would be happy to hear from you. Send comments or suggestions about our newsletter to beparks@wfubmc.edu.

Dave Iauco
President – NC Stroke Association Board of Directors

THE FACTS:

- Someone will suffer a new or a recurrent stroke every 45 seconds. Someone dies from a stroke every 3.1 minutes.[1]
- Stroke is the third leading cause of death and the leading cause of adult disability in the United States. Approximately 750,000 strokes occur annually.[2]
- Of the estimated 4 million stroke survivors in the United States, approximately two-thirds of them are moderately or severely impaired by the stroke.[3]
- In North Carolina, which is located in the "Stroke Belt", stroke death rates are two times higher than the national average for unknown reasons.
- Stroke is a major contributor to late-life dementia in 40% of adults over the age of 80.

[1]Centers for Disease Control
[2]National Stroke Association
[3]The North Carolina Heart Disease & Stroke Prevention Taskforce

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that targets high blood pressure in high risk groups and works to get out the word on the warning signs of stroke.

In addition, the work of the Task Force positioned NC to be one of the first two states in the nation to be awarded comprehensive Cardiovascular Health (CVH) funding by the Centers for Disease Control and Prevention (CDC) in 1998. The Task Force serves as the Advisory Board for the State Program.

The NC Heart Disease and Stroke Prevention (formerly Cardiovascular Health) Program

The CDC-funded State Program has greatly enhanced and expanded NC's ability to implement the comprehensive statewide plan. Program efforts focus on systems-level change to create communities, work places and health care systems supportive of cardiovascular health promotion and cardiovascular disease prevention. Because of the complexity and prevalence of cardiovascular diseases and risk factors, no single program working alone can make a difference. By working with multiple partner organizations – both public and private - in settings across the state, we are addressing physical inactivity, unhealthy eating, tobacco use, high blood pressure, high cholesterol, diabetes and overweight/obesity.

In addition, we have a particular interest in raising awareness of the warning signs of heart attack and stroke, and the need to call 911 in the presence of those signs. It is further necessary to assure that the appropriate care is accessible and that clinical guidelines are being followed in every setting where patients are seen. Numerous studies have revealed unacceptable racial, socioeconomic, gender, and geographic disparities in our state and everything that we do is designed to address and reduce these disparities.

This year, the State Program has applied for supplemental funding to implement a Stroke Registry in NC hospitals, in order to track and improve the quality of acute stroke care.

Taking a Regional Approach to Stroke

In September 1999, one week after the arrival of Hurricane Floyd, the NC Heart Disease and Stroke Prevention Task Force hosted a Tri-State Stroke Summit in Chapel Hill with South Carolina and Georgia. The purpose of the summit was to draw attention to the very high stroke death rates in the easternmost part of the three states. The summit ended with a call to action, and as a result a proposal was submitted to the CDC for supplemental funding for NC to coordinate a Tri-State Stroke Network. The Network is modeled on the Heart Disease and Stroke Prevention Task Force. It has 27 appointed members, nine from each of the three states. The members, as well as the supporting staff, resource persons, liaisons and consultants are a diverse and talented group with one thing in common – they care deeply about stroke. They advocate for increased funding for stroke research, prevention, treatment and rehabilitation.

What can YOU do about it?

Some of the factors that increase risk for stroke are unavoidable, such as age, sex, race, and family history. But, even if one has had a TIA or stroke – it is not too late to improve one's health and reduce the risk of another event. Each of us can do some simple things for ourselves and our families to reduce risks and increase our chances of leading longer, healthier lives. These things include addressing the risk factors that are within our control, by:

- Eating less salt, sugar and fat, and more whole grains and fruits and vegetables
- Eating smaller portions of the foods that we love
- Increasing physical activity by taking short walks during the day
- Not starting to smoke, or if we smoke, seeking help in quitting – and avoiding second hand smoke
- Using alcohol in moderation, if at all
- Knowing our numbers for blood pressure, blood sugar and cholesterol and seeking our doctor's help in getting them to goal.
- Taking medicine as prescribed
- Knowing the warning signs for heart attack and stroke, and acting to call 911 in the presence of those signs.

Learn more about stroke and what you can do about it by visiting the Task Force website at www.startwithyourheart.com and the Network website at www.tristatestrokenetwork.org

What are the Major Risk Factors?

Stroke is largely preventable by treating medical disorders and changing unhealthy lifestyles. These stroke risk factors include:

- high blood pressure
- atrial fibrillation
- high cholesterol
- diabetes
- cigarette smoking
- heavy alcohol consumption
- carotid artery disease
- excess weight
- sedentary lifestyle

Stroke risk factors such as diabetes and hypertension have increased sharply and are not restricted to older adults. Stroke contributes to the country's health care crises and it is considered to be an epidemic that will continue as the baby boomers age.

Today, treatments are available that may dramatically reduce a stroke's devastating effects—but they must be provided within a few hours of the onset of a stroke.

Therefore, if you experience any of stroke's warning symptoms, call 911 and get to the hospital **IMMEDIATELY!**

STROKE WARNING SIGNS

- Sudden one-sided weakness, numbness, paralysis
- Sudden trouble seeing in one or both eyes
- Sudden confusion, trouble speaking or understanding
- Sudden trouble walking, dizziness, loss of balance or coordination
- Sudden severe or unexplained headache

Stroke Education

at PITT COUNTY MEMORIAL HOSPITAL—Who, What and When

by Marie Welch

Patient and family education about chronic illnesses, the risk factors, warning signs and lifestyle changes to prevent these illnesses is extremely important. This education takes place on many levels. I would like to address education of stroke survivors and their families throughout the continuum—inpatient acute care, rehabilitation inpatient care follow-up after hospitalization and pre-hospital or prevention.

Pitt County Memorial Hospital

From the time the patient enters the hospital education should be ongoing. Through the Pitt County Memorial Hospital Education Department we have developed a booklet about stroke that includes information about prevention, stroke types and treatment. This booklet is written in simple language, at a fourth to fifth grade reading level and is given to every patient with a diagnosis of stroke. The Video-on-Call system is available to every patient through the television in his or her room. It is used to present videos about specific risk factors such as hypertension, cardiac disease and smoking cessation. Printed information about these risk factors and warning signs is also available. Most importantly, is talking with the stroke survivor to determine the reasons for stroke and reinforce information presented in the other media.

Regional Rehabilitation Center

The Regional Rehabilitation Center provides weekly education for all Stroke Survivors and their family members. These scheduled presentations (an ongoing two part series) reinforce the warning signs and risk factors of stroke and lifestyle changes to prevent secondary stroke. These sessions, which last approximately one hour each, are presented by Rehab Center Stroke Team members using a scripted flip chart and video. Our monthly Stroke Support Group has been active for over ten years and offers support and educational programs to Rehab Center stroke survivors and members of their families.

Community Outreach

Pitt County Memorial Hospital is pleased to partner with the North Carolina Stroke Association to provide community-based education and screenings as well as hospital-based visitation for all patients with a diagnosis of stroke. While in the hospital, each stroke survivor receives a visit from a representative of the program, is given pertinent reading information about stroke and receives a follow-up call approximately three months after stroke to determine how the person is doing and if they have any needs related to recovery. The second part of the program is community based and involves screenings, education and counseling and referrals to the person's primary physician. This program is funded by a grant from the Kate B. Reynolds charitable trust and although in its infancy in Pitt County, it has proven to be popular and very successful.

Pitt County Memorial Hospital works with various community groups such as the Council on Aging, churches and community health centers to spread the word about stroke prevention. We are located in the buckle of the Stroke Belt and have a mission to improve the health status of the residents of eastern North Carolina.

There is always more work to be done to bring the message to the community that Prevention is important, Stroke is an Emergency and one needs to act immediately!

Stroke Rehabilitation

at the REGIONAL REHABILITATION CENTER OF PITT COUNTY MEMORIAL HOSPITAL

The Regional Rehabilitation Center at Pitt County Memorial Hospital has been helping patients reclaim their lives since 1977. That is our mission and the reason for our existence. Every member of our staff, every nook and cranny of our Center is devoted to helping patients return to their families and their lives as quickly and completely as possible. We take our responsibilities very seriously and we are determined to provide care that is second to none.

Our goal is to improve quality of life for people in eastern North Carolina, to treat the whole person and to provide services that prevent or lessen impairments and promote abilities. We have 75 inpatient rehabilitation beds with 43 of those beds designated for patients with stroke and similar disorders.

From October 1, 2002 through September 30, 2003, the Regional Rehabilitation Center served 301 people recovering from stroke. Our goal is to help people recovering from stroke regain as much of their normal function as possible and to participate in home and community-based activities. Over 80% of our patients recovering from stroke returned home following discharge from the Regional Rehabilitation Center. Our assistance does not stop when the patient leaves the Center. We continue to monitor our patients' progress through the stroke follow-up clinic for at least 12 months after discharge.

The process of rehabilitation requires the best efforts of an experienced, integrated patient care team. The patient and their family are always at the center of our team. The other members of our interdisciplinary stroke rehabilitation team include rehabilitation physicians, rehabilitation nurses, occupational therapists, physical therapists, speech-language pathologists, audiologists, clinical psychologists, rehabilitation case managers, recreation therapists, orthotists, vocational rehabilitation evaluators, chaplains, and others. Treatment is an active process with both the patient and the family involved in goal setting, therapy and stroke education.

Services provided to patients recovering from stroke include:

- Aquatic therapy
- Communication evaluation and treatment
- Community reentry
- Counseling on sexual function
- Discharge planning
- Driver's evaluation
- Education about stroke recovery and prevention of future strokes
- Evaluation and treatment of hearing disorders
- Mobility evaluation and treatment
- Nutritional assessment and counseling
- Orthotics and adaptive equipment
- Psychological evaluation and treatment
- Socialization and peer support
- Stress management/relaxation
- Stroke support group
- Swallowing evaluation and treatment
- Training in activities of daily living
- Vocational evaluation and counseling

Our team approach ensures that patient needs are met on every level throughout the entire course of stroke treatment. We provide a rehabilitation continuum of care that includes:

- Inpatient Rehabilitation
- Day Rehabilitation
- Outpatient Rehabilitation
- Outpatient stroke clinics
- Home Health services

The Regional Rehabilitation Center is accredited by CARF . . . the Rehabilitation Accreditation Commission, for:

- Comprehensive integrated inpatient rehabilitation
- Pediatric family-centered rehabilitation
- Spinal cord system of care rehabilitation
- Brain injury comprehensive inpatient rehabilitation
- Comprehensive vocational evaluation

The Regional Rehabilitation Center is part of University Health Systems of Eastern Carolina, a regional health system that includes Pitt County Memorial Hospital, community hospitals, home care, physician practices and other independently operated health services. We are associated with a major academic medical center, the Brody School of Medicine at East Carolina University. For more information about the Regional Rehabilitation Center of Pitt County Memorial Hospital, please contact us at 1-800-219-8850 or 252-847-4400.

Stanly Memorial Hospital partners with North Carolina Stroke Association

by Margaret Rudisell

Stroke Screenings are an effective way to identify people at high risk of having a stroke. When Stanly Memorial Hospital began partnering with the North Carolina Stroke Association in 1999, the stroke death rate for the county was 48% higher that the North Carolina rate. Presently that rate has decreased approximately 48% to equal that of North Carolina. The screenings have enabled the disease management/health promotion staff to be out in the target population and to counsel people directly about their risk for stroke and ways to decrease that risk. It also has been a perfect venue to educate this target population about the symptoms of a stroke and what to do. We are seeing more people present to our Emergency Department with symptoms of a stroke, but they are not dying. The national average for administering tPA is around 2-3%. The rate at Stanly Memorial Hospital is between 10-12%. Stanly Memorial Hospital tackled stroke head-on when the statistics revealed the high death rates. SMH was recognized for their efforts in 2003 by winning the Premier Quality Award.

Stroke Risk Factors, Symptoms and Early Intervention

Physicians Play Key Role in Educating Patients

By Forsyth Medical Center

Prior to launching the StrokeSense program, Forsyth Medical Center conducted research with community residents. The research revealed that overall stroke risk factor awareness is moderate. Virtually all of the study participants named at least one risk factor for stroke. However, a more complete understanding of risk is missing, with only four in ten (44 percent) mentioning high blood pressure as a risk factor for stroke.

The research also revealed how participants would react if they experienced symptoms. Many would call 911 (36 percent) upon experiencing the warning signs of stroke, with females (42 percent) more likely than males (30 percent) to do so. A similar percentage overall (35 percent) would call their doctor upon experiencing signs of a stroke. While participants are willing to take action, the knowledge of the recommended actions to follow is limited.

Based on these results, the StrokeSense campaign comprises outreach to community physicians so they can be conduits to informing and educating patients. Physicians can continue to engage patients in a discussion about how to prevent stroke by controlling hypertension, and can set patient targets for blood pressure and cholesterol, addressing symptomatic carotid disease and atrial fibrillation, he says. Additionally, based on the fact that so few people know the warning signs of stroke, they can make sure patients understand the symptoms and stress the importance of calling 911 immediately to seek treatment.

For free patient brochures and/or posters dealing with prevention, detection of signs and symptoms and stroke treatment, physicians can call 336.718.0580.

Local Study Shows 60 Percent at Risk of Stroke

Nearly 60 percent of Forsyth County adults ages 40 to 70 are at risk for stroke, according to a new study released in April by Forsyth Medical Center. The study also shows that more than 40 percent of those in this age group are not aware of their risk for stroke. Almost half are not aware that being treated for stroke within one hour can limit or reverse damage.

Other Key Research Findings Include:

- 57 percent of participants in a recent survey qualified as being at-risk, yet only 15 percent had been diagnosed or perceived themselves as at-risk.
- Nearly two in ten participants could not name any warning signs. Only 51 percent of the participants recognized the most common warning sign: Sudden numbness or weakness of the face, arm or leg.
- About one-half (51 percent) of participants recognized the need to seek treatment within one hour of the onset of stroke symptoms in order to limit or reverse damage.
- Approximately one-third (35 percent) of participants reported having either high blood pressure or high cholesterol.
- 77 percent of respondents engage in behaviors or have a family history of heart disease that can lead to an increased risk of stroke. Behavioral factors include being overweight by 20 pounds or more, smoking cigarettes, and eating foods on a regular basis that are high in fat and salt.
- Only 36 percent of survey participants would call 911 if they thought they were having a stroke.

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Dr. Chase Joins Forsyth as Medical Director of Stroke Program

In August 2003, Chere Chase, M.D., joined Forsyth Medical Center as Medical Director of Stroke and Neurocritical Care. Dr. Chase received her M.D. from the University of Maryland School of Medicine and completed post-graduate training in neurology at Case Western Reserve University and a fellowship in neurosciences critical care at Johns Hopkins School of Medicine. Before joining Forsyth, Dr. Chase was a clinical instructor at Johns Hopkins and practiced neurology in the Greater Baltimore Medical Center.

Dr. Chase has been co-investigator on many clinical trials and served as principal investigator on a statewide study assessing preparedness for acute ischemic stroke care in Maryland. Studying stroke care in a community hospital setting is one of her primary clinical research interests, she says, one that she pursues actively at Forsyth.

"It is important for hospitals to know how to take care of patients in the real world setting. At Forsyth, we're very lucky to have the technology and specialized staff to offer acute stroke care. But what happens with a small hospital that can't afford a CT scanner, has a long wait time for CT exams or who can't afford to have a CT tech available 24 hours, seven days a week? Some hospitals are so burdened, and our research will focus on how can we help those hospitals."

Stroke Risk Intervention

by WAKE FOREST BAPTIST MEDICAL CENTER

New evidence confirming that surgery to open narrowed neck vessels can dramatically reduce stroke risk means more people should be getting the treatment – and points out the need for screenings to diagnose the condition – say researchers from Wake Forest University Baptist Medical Center.

"We now know definitively that we can reduce stroke risk by half with surgery to 'clean out' narrowed arteries leading to the brain – even in patients who have no symptoms," says neurologist James Toole, M.D. "We should offer this option to more patients, as well as begin screening seemingly healthy individuals for stroke risk."

Toole's comments are in response to a report in *The Lancet* on the "Asymptomatic Carotid Surgery Trial," a study based in England of more than 3,000 patients. The results – that surgery to remove fatty deposits from narrowed vessels in the neck can significantly reduce stroke risk – were nearly identical to the findings of a study that Toole coordinated in the United States and Canada.

Both studies looked at the value of surgery, called carotid endarterectomy, in people who have no symptoms, but whose carotid arteries were narrowed by at least 60 percent, a condition called carotid artery stenosis. The surgery is typically offered only to patients who have symptoms of an impending stroke.

The studies found that about 12 percent of study participants in the non-surgery group had strokes, half of them fatal or disabling. In the surgery group, about 5 percent or 6 percent had strokes – a risk reduction of at least 50 percent.

More than 500,000 new strokes occur each year in the United States, and it has been estimated that carotid artery disease may be responsible for 20 percent to 30 percent of them.

Wake Forest University Baptist
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"The research results, which confirm a benefit of surgery to prevent stroke in people who had no symptoms, despite having severely narrowed arteries, highlight two important issues for stroke prevention," says Charles Tegeler, M.D., professor of neurology at Wake Forest Baptist. "First, we need to screen more adults for narrowed carotid arteries. Second, patients with severe carotid narrowing should at least be considered for the surgery as a stroke-prevention treatment."

Toole recommends that men undergo a baseline screening of their carotid arteries between the ages of 50 and 60, depending on their overall health. The simple test, which was pioneered by Wake Forest, uses ultrasound technology to gauge artery health. Toole believes that both men and women with diabetes, hypertension or a family history of stroke – all which increase the risk of stroke – should be screened in their 40s.

The surgery can be performed under local or regional anesthesia. Wake Forest Baptist, which was the first in the country to perform the surgery while the patient was awake, today performs a majority of carotid endarterectomies this way. Across the country, however, many of the surgeries are still performed under general anesthesia.

John Wilson, M.D., a neurosurgeon at Wake Forest Baptist, said performing the surgery while the patient is awake allows even higher-risk patients to have the procedure with a low rate of complications.

Life After Stroke

I'm here to prove there is life after a stroke. My name is William Proctor and I am 51 years old. I had a stroke four years ago at the age of 47. Here is my story.

While my wife and I were school shopping, I began to experience the worst headache I had ever had. My vision was also affected. My wife immediately called the local EMS and I was transported to the hospital. When I arrived, I underwent diagnostic tests. The emergency room physician diagnosed me as having had a stroke. You see, I was told several years prior to my stroke that I had diabetes. However, I failed to take care of my health.

The stroke left me paralyzed on my left side. After several weeks of stroke rehabilitation, I was able to come home, but I had limited mobility. I began experiencing depression within several weeks of discharge. I wanted to end my life. But, each day I awakened, I knew that the Lord kept me here for a reason. Now, my goal is to help stroke survivors and their families cope. You see, stroke affects the entire family. The family takes care of a stroke survivor's needs and they try to make certain that resources are available to administer care.

I have learned to stop and think before I speak. I remind myself that my family is going through this experience with me and I do not want to make this experience harder on them. At times, I struggle. But, I pick myself up and start over again. You see, the Lord gave us free will. With the Lord's help, I have been able to adjust my heart and soul to living with limitations. I feel it is what a person makes of it.

I hope my words are able to help someone. In sharing my words I, too, am helped.

William Proctor, *Stroke Survivor*
Statesville, NC

"Cycle for Life…Spokes Against Stroke" Bike Tour

The North Carolina Stroke Association "Cycle for Life…Spokes Against Stroke" Hanover Park Vineyard Bike Tour will be held on Saturday, October 16, 2004. The tour includes cycling at various mileage options or walking in the one-mile tour around Hanover Park Vineyard, which is located in Yadkinville, NC. A hearty lunch and wine-tasting will be part of the event. Bluegrass music entertainment will be provided for participants. For more information, contact the North Carolina Stroke Association's office at 336-713-5052.

Stroke Rehabilitation: an Exciting Future

by Dr. David Good

Weakness and movement problems are very common following stroke. Stroke rehabilitation is invaluable in promoting return to home and community for stroke survivors with these problems. Traditionally, rehabilitation has been organized around programs of physical and occupational therapy. While traditional rehabilitation unquestionably facilitates a person's ability to adapt to their deficits, therapy has never been proven to truly promote "reorganization" of brain function. In recent years, however, rehabilitation scientists have been developing interesting new concepts that hold the promise for improved therapy programs in the future. Recently it has been clearly shown that normal remaining brain tissue can undergo changes in nerve activity in response to intensive training, even in people many years after stroke. For example, nerve cells in the vicinity of the stroke are able to change their activity in order to compensate for nerve cells lost because of the stroke. A number of new laboratory techniques have shown beyond a doubt that the remaining brain is "plastic," meaning it has the capability to change over time. Even more exciting, specific intensive therapy techniques seem to accelerate this "plasticity." A major study headquartered at Emory University in Atlanta also includes rehabilitation investigators at the University of North Carolina and Wake Forest University. This technique, know as "constraint induced movement therapy (CIMT)" forces individuals to use their stroke affected hand during very intensive training. The training emphasizes practical everyday tasks performed repetitively. Although this form of therapy does not work for persons with severe strokes, there is hope that it may be beneficial for people with moderate size strokes. The results of this study, known as EXCITE, should be available within the next 6 months. Another technique to improve recovery is the use of drugs that affect neurotransmitters, the chemicals that allow nerve cells to communicate with one another. Dr. Larry Goldstein at Duke University is currently supervising a study using amphetamine, a drug that might enhance brain plasticity following stroke. Doctors at Duke and Wake Forest are also studying the possibility of other new medications that might be used in combination with therapy to improve recovery. Although none of these new therapies or drug treatments is approved for general use at this time, researchers hope that their current studies will lead to the development of individual treatment plans for each person with stroke. It is not unreasonable to expect that in years to come it will be standard practice to combine a specific type of therapy program and specific medication tailored to a particular type of stroke a person had.

This is an exciting time for stroke rehabilitation. More attention then ever has been placed on this aspect of stroke care, and the future is hopeful. For now, many current therapy techniques are still of great assistance in helping stroke survivors return to an active and satisfying life style.

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