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facts about  
**RHEUMATIC FEVER**

FEDERAL SECURITY AGENCY  
Social Security Administration

U. S. Children's Bureau



panied with high fever, are more definite clues that aid the doctor in diagnosing rheumatic fever.

St. Vitus' dance (chorea) is another form of rheumatic fever. Awkward, jerky movements of the face, arms, and legs—especially when the child tries to feed or dress himself, or pick up objects—and unexplained crying spells, suggest the possibility of chorea.

If a child develops any of these signs of rheumatic fever, a doctor should be consulted at once. Don't make the tragic mistake of ignoring such danger signals even though they seem mild and vague.

Even the experienced doctor often finds it difficult to recognize rheumatic fever because the signs are so varied and so vague. For example, the so-called "growing pains" of childhood may be of no consequence at all. Or they may actually be rheumatic in origin. A slight fever may be normal for one child. In another child it may be evidence of rheumatic infection. A doctor should see a child who is suffering from any one of these symptoms.

The doctor will need to have a complete medical history of the child, give a thorough physical examination, and make special tests before he can know for sure whether or not the child has rheumatic fever.

### Why is rheumatic fever so serious?

Rheumatic fever kills more school-age children in the United States than any other disease. Actually, however, the large number of deaths caused by the disease only suggests the size of the problem. For every child who dies of rheumatic fever, there are many more who are attacked by the disease and who do not die of it but have long drawn-out attacks lasting many months. About half a million of our children now have rheumatic fever or have had it in the past. No one can measure the physical suffering and heartbreak it has caused and is still causing.

After an attack of rheumatic fever a child may be left with some scarring of the heart, which is known as rheumatic heart disease. For a long time it was said that rheumatic fever was a serious disease because it caused rheumatic heart disease. People believed that children with rheumatic heart disease might even "drop dead." This is not true. It is rheumatic fever itself that is the danger. For it is rheumatic fever that kills and that causes long periods of illness.

It is important, then, to know whether a child has had rheumatic heart disease because if so, he is apt to have another attack of rheumatic fever. Doctors cannot tell usually whether a child has rheumatic heart disease on the basis of a physical examination alone because a large number of perfectly normal children have "heart murmurs." If the doctor is to know whether or not a heart murmur really indicates heart disease, he will need a complete medical history of the child, a complete physical examination, and laboratory tests, such as X-ray, fluoroscopic examination, and electrocardiogram.

Once the diagnosis of rheumatic heart disease is made, steps must be taken to prevent another attack must be taken.

### How should a child with an attack be cared for?

When the child first becomes ill with rheumatic fever, the doctor recommends that the child receive care in a hospital or in an expert medical and nursing care. At the beginning of the attack, treatment for relief of fever and pain. If the fever is high, drugs will be given. And if the heart is so weak that it cannot pump blood and in some cases oxygen, will be used to maintain the child's life.

Even after the acute symptoms have passed, the child may need care for a long period. The child may need care for a week or longer. This is the hardest part of the illness. The child must rest and feel well.

Good medical and nursing care and cheerfulness are essential during the long siege of illness.

Sometimes the child may be cared for at home.

This boy has fully recovered from the disease and is attending school regularly to the State rheumatic fever hospital.





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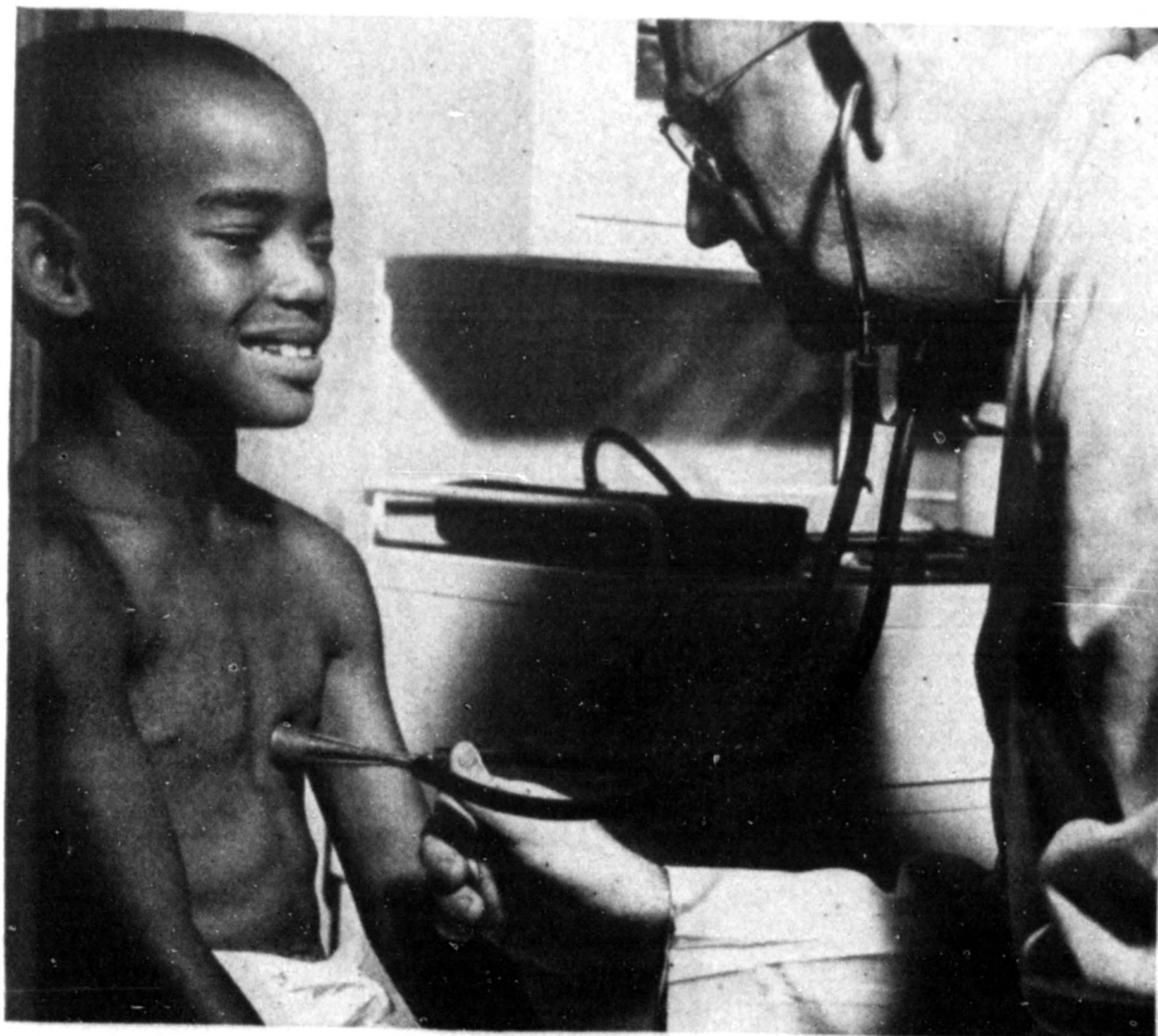
When the child first becomes ill with rheumatic fever, a doctor usually recommends that the child receive care in a hospital, where he can have expert medical and nursing care. At the hospital, the child will receive treatment for relief of fever and pain. If the child has chorea, sedative drugs will be given. And if the heart is seriously affected, special drugs, and in some cases oxygen, will be used to make the child more comfortable.

Even after the acute symptoms have lessened, the illness ordinarily lasts for a long period. The child may need to stay in bed for 6 months or longer. This is the hardest part of the illness, since the child may look and feel well.

Good medical and nursing care and cheerful and comfortable surroundings are essential during the long siege of illness.

Sometimes the child may be cared for at home during this period. But

This boy has fully recovered from the disease, but returns regularly to the State rheumatic fever clinic for examination.





often it is too difficult for a busy mother, especially when she has other children, to keep the child quiet and happily occupied. Under such circumstances a convalescent home, a sanatorium, or a foster home may be the answer.

It is important, too, that the child's schooling be continued, except when he is acutely ill. Many hospitals and convalescent homes provide schooling and occupational therapy. Some States have special teachers who come into the home to teach a child who is sick.

When the doctor has decided that the child is really well, he will allow him to increase his activity by easy stages. After a few weeks of this, the child can usually return to his normal life of school and play.

### How can further attacks be prevented?

Unlike the common contagious diseases of childhood against which the body builds up an immunity following an attack, rheumatic fever can attack a child again and again.

For this reason every effort should be made to prevent another attack. The child should be examined periodically by a doctor, and any illness should be treated. The child's general health and resistance to disease should be kept high by good health habits, nourishing food, and plenty of rest. Exposure to colds or other respiratory infections must be avoided as far as possible. The child's clothing should be warm enough. Wet shoes or clothing should be changed promptly.

If the child's home situation is unfavorable to healthy living and satisfactory family relationships, because of poor physical environment, lack of understanding by the family, or emotional problems, adjustments must be made.

Parents sometimes ask if taking a child to a warmer climate would help to prevent a second attack. Rheumatic fever can occur in any climate. Whatever the advantages of a warm climate, they probably are no better protection against rheumatic fever than healthful living conditions in a cold climate.

So far no specific method of preventing recurring attacks has been found. There is some hope that very small daily doses of sulfa drugs given under a doctor's close supervision, may protect the child.

### Can the rheumatic child have a normal life?

The child who has had rheumatic fever can usually live a normal life and take his part in the activities children of his age enjoy and need even if he has developed rheumatic heart disease. Only a small percentage of children are found at adolescence to have so much damage to their hearts that they cannot live normal lives. The child who has had rheumatic fever must not be so "babied" that it will be hard for him to meet



A child who has had rheumatic fever can usually live a normal life and enjoy all the things that other children do.

the demands of his home and school and his friends and people.

### What is being done about rheumatic fever?

In some States special programs for crippled children have been developed in connection with the Social Security Act.

A Nation-wide program to help crippled children was developed under the Social Security Act. Under this program the United States through their representatives contribute money to the Children's Bureau and the States that put up some additional funding for care for crippled children. At present the Federal Government contributes is \$3,870,000.<sup>1</sup> The States are to care for as many of them as is available. All the States now have such programs.

In 1939 Congress authorized the Children's Bureau to care for children with rheumatic fever in the United States. By June 1946, 20 States had approved plans for care of children with rheumatic fever or rheumatic heart disease. District of Columbia, Iowa, Massachusetts, and New York.

<sup>1</sup> In July 1946, Congress increased this amount to \$4,000,000.



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THE NEW YORK TIMES PHOTO

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### What is being done about rheumatic fever?

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A Nation-wide program to help crippled children was begun in 1935  
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money to the Children's Bureau and the Bureau, in turn, gives it to the  
States that put up some additional funds and draw up plans for provid-  
ing care for crippled children. At present the amount the Federal  
Government contributes is \$3,870,000.<sup>1</sup> In each State there is an agency  
for crippled children whose duty it is to locate the children needing care  
and to care for as many of them as is possible with the limited funds  
available. All the States now have such programs.

In 1939 Congress authorized the Children's Bureau to include services  
for children with rheumatic fever in the program for crippled children.  
By June 1946, 20 States had approved programs for the care of children  
with rheumatic fever or rheumatic heart disease—California, Connecti-  
cut, District of Columbia, Iowa, Maine, Maryland, Massachusetts,

<sup>1</sup> In July 1946, Congress increased this amount to \$7,500,000.



Michigan, Minnesota, Missouri, Nebraska, Nevada, New Jersey, Oklahoma, Rhode Island, South Carolina, Utah, Virginia, Washington, and Wisconsin. About 15 more States are planning such programs.

### **Why are State and community programs for the care of rheumatic children necessary?**

Many different persons, institutions, and agencies must be called on if children with rheumatic fever are to receive the care they need. Doctors, public-health nurses, welfare workers, teachers, and parents must all work together if the disease is to be controlled. This makes a well-coordinated plan essential. Without such a plan children will not receive essential care.

### **What does the State do?**

A State rheumatic-fever program usually starts by providing service for only a few counties and then extends it as rapidly as possible to other counties. The program is set up in a place where good medical, medical-social, and public-health-nursing services can be obtained most readily, and where hospitals, clinics, sanatoriums, and convalescent homes are available.

Special diagnostic services are provided for children suspected of having the disease, and medical services, hospital care, convalescent care, and after-care services are provided for the children who are found to have rheumatic fever or heart disease. Any medical care needed by the child is made available to him.

### **Who is eligible for care?**

Children under 21 who have heart disease or conditions that might lead to heart disease are eligible for care. All the State programs put special emphasis on the care of children with rheumatic fever or rheumatic heart disease but children with certain other types of heart disease are cared for too.

Any child who lives in an area in which a program is operating may go to the clinic for a diagnosis; children are given free hospital and convalescent care if their families cannot afford to pay for all the treatment they need. It is not necessary for the family to have established legal residence in the area in which the program is in operation in order to be given services.

### **How are the rheumatic children found?**

Doctors locate many rheumatic children in the course of their practice or in schools or clinics. Other children are referred to the State agencies by public-health nurses in the community and in the schools, and by teach-

ers, social agencies, and the parents. State rheumatic-fever programs help brothers and sisters of children who frequently strikes more than one

### **Who takes care of the program?**

When a child with rheumatic fever is in a State rheumatic-fever program, a well-trained pediatrician takes care of him for his medical care, whether he is in a hospital, a convalescent home, or his own home. Treatments are given during the stage of acute infection and after the acute infection has subsided.

A medical-social worker studies the child's home life and the effect his attitude toward recovery. By working with the family, she helps to solve out any difficulties that are in the way of the child's benefit from the treatment given.

A public-health nurse is responsible for seeing that the rheumatic fever children in their homes and the pediatrician in seeing that help is given out by families, teachers, and the community. The home is taught how to give bed-

A loom to work with, a gift to make enjoyable hours





Idaho, Nevada, New Jersey, Oklahoma, Utah, Virginia, Washington, and Wyoming plan such programs.

**Why are such programs for the care of children necessary?**

Such programs and agencies must be called on to receive the care they need. Doctors, nurses, teachers, and parents must be controlled. This makes a well-planned such a plan children will not

usually starts by providing service as rapidly as possible to other places where good medical, medical services can be obtained most readily, hospitals, convalescent homes, and convalescent homes are

provided for children suspected of rheumatic fever, hospital care, convalescent homes for the children who are found ill. Any medical care needed by

disease or conditions that might lead to rheumatic fever. All the State programs put special emphasis on rheumatic fever or rheumatic heart disease or other types of heart disease are cared for.

Wherever such a program is operating may go to such places are given free hospital and convalescent care and afford to pay for all the treatment. The family to have established legal responsibility if a program is in operation in order to be

**Where are children found?**

Children are found in the course of their practice by doctors who are referred to the State agencies, hospitals, and in the schools, and by teach-

ers, social agencies, and the parents of the children themselves. Many State rheumatic-fever programs make a special point of examining the brothers and sisters of children with rheumatic fever, since the disease frequently strikes more than one member of a family.

**Who takes care of the children under the State program?**

When a child with rheumatic fever is accepted for care under the State program, a well-trained pediatrician employed by the State is responsible for his medical care, whether he is in a hospital, sanatorium, convalescent home, or his own home. Treatment and continuous medical supervision are given during the stage of acute infection and for as long as necessary after the acute infection has subsided.

A medical-social worker studies the conditions surrounding the child and the effect his attitude toward his illness has on his chance for complete recovery. By working with the family and the child, she tries to smooth out any difficulties that are interfering with the child's getting full benefit from the treatment given him.

A public-health nurse is responsible for supervising the care of rheumatic fever children in their homes and in the schools. She works closely with the pediatrician in seeing that his directions are understood and carried out by families, teachers, and nurses and that someone in the child's home is taught how to give bedside care, to prepare the proper food for

A loom to work with, a gift to make, give this youngster many enjoyable hours during convalescence in the sanatorium.





the patient, and to provide interesting and suitable activities during the period of the child's illness and recovery. She works with other professional workers in maintaining high standards of care throughout the acute and convalescent periods.

### What care does the child receive?

The child's condition is diagnosed by a pediatrician in a clinic that has all the necessary equipment. The clinics are held regularly and appointments are made in advance so that no more children are admitted at any one session than the professional workers are able to study carefully—usually six to eight children in a half-day clinic session. The medical and family histories of the child are taken, a physical examination is given, and the necessary laboratory tests are made. The medical-social worker and the public-health nurse help the parents make plans for the child. Sometimes a child is sent to a hospital for observation or, if the child is too ill to go to the clinic, the doctor makes a visit to his home.

A child who is acutely ill is given care in a hospital that has a special children's ward with a pediatric staff. The State agency selects hospitals which give this care.

After the acute stage is passed, the child is transferred to a place where he can have a long period of bed rest during the chronic stage of the disease. Although the child still needs good medical and nursing care, he can be better protected from colds and other infections, can lead a more normal social life, and can have better educational experiences if he does not spend this long period of rest in bed in a regular hospital ward for such children.

Care during the chronic stage is provided in different ways in different States. It may be given in a hospital with a sanatorial ward, a sanatorium, a convalescent home, a foster home, or the child's own home.

Although it is often difficult for the mother to take care of a child who must spend a long period of time in bed, it is sometimes possible for the child to receive the care he needs in his own home. He must be provided with continuous medical and nursing supervision. He must be protected from all infectious diseases, particularly those that affect the nose and throat. The home must be a clean, peaceful, pleasant place where he can have plenty of good food of the proper sort and complete rest, with enough enjoyable diversion and enough interesting things to do to keep his mind and hands busy so that he will not be restless and unhappy.

### Why is after-care important?

After the chronic stage has passed, after-care is extremely important, for although the child should be encouraged to live as normal a life as possible, every care must be taken to avoid another attack of the disease. He must return to the State rheumatic-fever clinic regularly for examination and advice. If the child cannot get to the clinic, transportation is



Convalescence at home may be an enjoyable enough interesting thing.

taken care of by the State agency, social worker, and nurse must plan which the child can be given the things

### Are education and vocational

The child's education during the taken care of by the State or local provide for bedside or group teaching convalescent homes, and in some State own home.

In some instances adolescent children by their illness and whose activities special guidance in selecting a v through State vocational-rehabilitati

### Are we doing enough?

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taken care of by the State agency. The clinic staff doctor, medical-  
social worker, and nurse must plan with the family to find some way by  
which the child can be given the things he must have if he is to keep well.

### Are education and vocational guidance provided?

The child's education during the tedious "get well" period is usually  
taken care of by the State or local board of education. Many States  
provide for bedside or group teaching in hospitals, sanatoriums, and con-  
valescent homes, and in some States visiting teachers go to the child's  
own home.

In some instances adolescent children whose hearts have been damaged  
by their illness and whose activities must be sharply limited will need  
special guidance in selecting a vocation. Arrangements are made  
through State vocational-rehabilitation services for such guidance.

### Are we doing enough?

Each year rheumatic fever cripples or handicaps many thousands of  
children. State crippled children's programs reach only a few thousand  
each year in 257 of the 3,000 counties in the United States. As a Nation,  
we have only taken the first step in the right direction. Some day, if we  
plan well in our States and in our communities, every child who has  
rheumatic fever can have the care he needs and must have if he is to  
enjoy a full, happy life.



## STATE BOARD OF HEALTH

Madison, Wisconsin

1946

## SIMPLE (ENDEMIC) GOITER

## The Prevention of Goiter

Goiter is a visible enlargement of the thyroid gland situated in the lower and fore part of the neck. When the gland is normal in size, there is no evidence of its presence.

"Simple endemic goiter," remarks Marine, "considered from the viewpoint of world medicine, is one of the most important and widespread causes of human suffering and a physical and mental degeneracy with which society has had and still has to deal." ("Pathology of Internal Diseases"—Boyd).

Goiter is considered a deficiency disturbance. Lack of iodine in the vegetables and water in the Great Lakes basin and upper Mississippi Valley subjects the people living in these areas to enlargement of the thyroid gland.

Rickets is a chronic nutritional disorder. Cod liver oil in proper quantities is one of the agents for its prevention. Goiter is a deficiency or nutritional disturbance. Small amounts of iodine taken once a week for thirty-six or forty weeks a year are used to prevent goiter.

Dr. George Crile and Dr. George Crile, Jr., state in the Medical Clinic of North America, May, 1936, Cleveland Clinic Number, "Although an adequate intake of iodine should be afforded the growing child, it is doubly important that the adolescent child should have prophylactic doses of iodine. A 25% solution of Potassium Iodide in doses of one minim once a week is the cheapest form in which prophylactic doses of iodine may be prescribed. By thus applying the physiological demands of pregnancy not only is goiter in the mother prevented, but congenital goiter and cretinism in the child may be prevented. At the present time the common brands of iodized salt contain only one part per 5,000 of iodine and the intake of iodine by a person who lives in a region where endemic goiter is present and who uses iodized salt is no greater than that of a person who lives by the sea and uses uniodized salt."

Plummer sums up the effects of iodine in goiter as follows:

- (1) It prevents diffuse colloid goiter (endemic goiter) in man.
- (2) It prevents the hyperplastic goiter of animals.
- (3) It prevents the hyperplastic goiter of fish living in polluted water.
- (4) Given to goiterous mothers, it prevents cretinism in the offspring.

## Pre-School Children

Examination of the children of Wisconsin has proven that in some localities from 8% to 11% of them develop a simple goiter before they reach the age of six years. It is in evidence that such children do not receive a sufficient amount of iodine during their early childhood. To overcome this deficiency, a small amount of iodine (5 milligrams or 1/12 of a grain) should be given once a week for eight or nine months of the year.



## SCHOOL CHILDREN

### The Method of Using Iodine for Prevention

The State Board of Health of Wisconsin recommends that local medical men and school authorities interest themselves in the methods of goiter prevention because of its great prevalence in this state.

For preventing goiter a tablet is recommended containing ten milligrams (1/6 grain iodine) to be taken once a week during the school year. It is usually given to pupils from six to seventeen years of age and to boys as well as girls. A child with enlarged and conspicuous goiter should be under a physician's guidance continuously. The usual procedure is to entrust the handling of the tablets to the teacher, who in turn delegates the record keeping to one of the pupils. A permit should be obtained from the parents of each child. It is advisable to have a physician health officer or other physician come into the school for the purpose of looking over the children who elect to take the treatment.

A number of states like Michigan, Utah, etc., have adopted the use of iodized salt. A limited survey shows that from 50 to 65% of the salt used in Wisconsin is iodized salt. The use of iodine, therefore, is for the prevention of simple goiter. It is to be used only in small doses to overcome the lack of iodine in foodstuffs. Iodine as a food should be given yearly to boys and girls. It is not intended for use in adult goiters nor pronounced and irregular forms in children. The diagnosis and treatment of adult goiters and irregular forms in children should be under the direction of a physician. Each expectant mother should receive iodine under the advice of her physician, to prevent cretinism and other degenerative conditions. Many of the adult goiters are the continuance of the simple goiters of childhood. Goiter should become as rare in Wisconsin as it is with the people who live by the sea, where there is a sufficient amount of iodine in the sea foods and vegetables to prevent goiter.



D19



**RHEUMATIC**

**FEVER**



**METROPOLITAN LIFE INSURANCE COMPANY**

HOME OFFICE: NEW YORK  
Pacific Coast Head Office: San Francisco  
Canadian Head Office: Ottawa





### What Rheumatic Fever Is

**I**T is generally agreed that rheumatic fever is an infection. An infection is a disease caused by a germ or a virus.\* The particular germ or virus responsible for rheumatic fever has not been discovered, but it has been discovered that rheumatic fever is not spread in the same way that easily caught infections like chickenpox and measles are spread.

This leads to the belief that children who do get rheumatic fever are especially susceptible to it. Recent studies seem to show that special susceptibility to rheumatic fever is inherited. That is, it tends to run in families. It is probable, however, that inherited susceptibility and one or more other things *working together* make a child likely to have attacks when he reaches the age at which the disease usually develops. Among these "other things" are frequent chilling, damp or overcrowded living quarters, a poor diet, a recent attack of scarlet fever, tonsillitis, a bad cold, or some other infection caused by certain streptococcus germs.

There is no need to worry about letting healthy children play with a child who has had rheumatic fever because of the danger of contagion. However, parents of children who have had rheumatic fever should be very careful to protect such children from other people's colds and sore throats.

### When to Suspect It

Sometimes it is hard, if not impossible, to recognize rheumatic fever when it first begins, because the early signs in some cases are so slight. A rheumatic attack may be accompanied in the beginning by any of the signs and symptoms listed on page 2. Of course, these signs, either singly or in combination, do not

\*A virus is a disease agent much smaller and simpler than a germ.



mean that a child surely has rheumatic fever, but they do mean that he should be examined by a physician.

- Failure to gain weight.
- Poor appetite.
- Pallor.
- Repeated nosebleeds.
- Low persistent fever.
- Frequent complaints of pain in the arms, legs, or abdomen.



More definite signs of rheumatic fever include painful, inflamed joints, and chorea, usually known as St. Vitus's dance. Chorea causes uncontrollable twitching or jerking of the face, arms, or legs, and emotional disturbances. If a child gets irritable without good reason, begins to cry easily, doesn't act like himself, or develops nervous habits, a physician should see him. Children with these symptoms may not have St. Vitus's dance, but their condition makes an examination advisable in any case.

It is very important to find out whether an attack of rheumatic fever has damaged a child's heart. It sometimes happens that rheumatic heart disease is first suspected in the course of a child's school medical examination. It is easy to see how important it is to have this finding checked by the family physician or a pediatrician, a specialist in children's diseases.

### The First Attack

The first attack of rheumatic fever is likely to strike susceptible children when they are about 5 or 6 years old. The body does not build up any special protection against rheumatic fever. Although many children have only one attack, others are likely to go on having them. During the teens, recurrent attacks often become fewer and fewer and, in many cases, at about 15 or 16 years of age they stop altogether. In this sense, many young people do "outgrow it." However, adults can and do have rheumatic fever, some even for the first time, although most attacks in adults are believed to be recurrences of attacks which began in childhood.

### Getting Well

The seriousness of its effect on the heart there is some involvement in some cases, the inflammation may be so severe that the patient and cause death. With recovery from rheumatic fever, individuals are left with a damaged heart. If the damage is avoided, this damage may eventually be wiped out and not to interfere with full, normal activity. With rest and play, people with rheumatic heart disease, and those with damaged hearts, can live reasonably active and normal lives.

A child with rheumatic fever should not be allowed to do any of the things the physician permits. It is vitally important that the child do all unnecessary work for as long as the disease lasts, and the period of convalescence afterwards. The physician can judge when it is safe to let the child get up and about, and be followed *exactly*, no matter how well the patient feels after the attack seems. Good nursing is important for all patients. In communities which have visiting nurses, a nurse can give help of great value to the patient.

As convalescence progresses, it can become a child reasonably content to stay in bed. It is important to be helped to understand that staying in bed is not a punishment, and things he can do later on depend largely on doctor's orders. The physician wants him to do.



other services available to bedridden children, such as those who help a child with his school work, and who teach games, handicrafts, and all sorts of skills.



**Getting Well**

The seriousness of rheumatic fever is due to its effect on the heart. In nearly all attacks there is some involvement of the heart. In some cases, the inflammation may be so severe as to overwhelm the patient and cause death. With recovery from the acute attack, many individuals are left with a damaged heart. If further attacks can be avoided, this damage may eventually be wiped out or remain so slight as not to interfere with full, normal activity. With care in choosing work and play, people with rheumatic heart disease, even many with severely damaged hearts, can live reasonably active and useful lives.

A child with rheumatic fever should not be allowed to get up until the physician permits. It is vitally important that the heart be spared all unnecessary work for as long as the disease is active and for the period of convalescence afterwards. The physician is the only one who can judge when it is safe to let the child get up, and his directions should be followed *exactly*, no matter how well the patient feels or how slight the attack seems. Good nursing is important for rheumatic fever patients. In communities which have visiting nurse service, a visiting nurse can give help of great value to the patient and to the doctor.

As convalescence progresses, it can become quite a problem to keep a child reasonably content to stay in bed. First of all, he should be helped to understand that staying in bed is temporary, and that the things he can do later on depend largely on doing now exactly what the physician wants him to do.



**Diversions During Convalescence**

If a visiting nurse is coming in, she may be able to help find ways to keep the child occupied. She will know of

other services available to bedridden children, such as home teachers who help a child with his school work, and other trained workers who teach games, handicrafts, and all sorts of skills and amusements. Where

these services are not established, the regular school librarians are often glad to suggest ways of keeping the child within the activity limits the physician allows.

Most homes have on hand a good many things to keep a restless child busy for hours. Old magazines and wallpaper sample books furnish good cutouts. Paper, ironed smooth, can be used for scrapbooks. Pictures can be pasted on waste baskets, trays, etc., for the sorts of amusing animals can be made by letting the child cut out legs, tie them into desired shapes, and embroider. Jumping jacks can be made and tied to the end of a string. These are only a few of the amusements that can be provided without much expense.



**Prevention**

The avoidance of exposure to cold and wet is important in preventing rheumatic fever. Children should learn the importance of protecting themselves from the cold. Anyone with a cold should be protected from wet. He must learn to eat the right kinds of food and to do everything within his power in the best possible way. A child who has had serious heart damage should stay within these limits. Frequent medical checkups are necessary.

All these things can be done in the clinic. They do not guarantee that a child will be



these services are not established, the regular school teachers and local librarians are often glad to suggest ways of keeping a child occupied within the activity limits the physician allows.

Most homes have on hand a good many simple things which can keep a restless child busy for hours. Old magazines, mail-order catalogs, and wallpaper sample books furnish good cutout material. Wrapping paper, ironed smooth, can be used for scrapbooks. Flower cutouts can be pasted on waste baskets, trays, etc., for the child's bedroom. All sorts of amusing animals can be made by letting a child stuff old stocking legs, tie them into desired shapes, and embroider faces on them. Paper jumping jacks can be made and tied to the end of the bedpost where the child can pull the string. These are only a few of the opportunities for amusement that can be provided without much expense.



### Preventing Recurrences

The avoidance of respiratory infections is important in preventing recurrences of rheumatic fever. The rheumatic child must learn the importance of keeping away from anyone with a cold or sore throat, and of protecting himself against chilling and getting wet. He must learn to eat enough of the right kinds of foods, to get enough rest, and to do everything which will help to keep him in the best possible physical condition. If serious heart damage exists and the physician has limited his activity, he must learn to stay within these limits. Also, he should have frequent medical examinations.

All these things can be done in the climate where the child lives. They do not guarantee that a child will be spared repeated attacks,



but they do help him to maintain good health, and therefore to make further attacks less likely.

It has been found, in some cases, that certain drugs are useful in preventing recurrences. The physician may prescribe such treatment.



### Summing Up

Not all children who have had rheumatic fever develop rheumatic heart disease. Even among those who do, many do not develop a condition serious enough to prevent their living a normal life. In spite of this, children who have rheumatic heart disease are frequently so protected that they are literally not allowed to stand on their own feet. While it is important to provide the child with healthful surroundings and wholesome food, harm can be done by overemphasizing the physical handicap. The child who has had rheumatic fever, or has some degree of heart damage, should not be coddled but should have "the run of the house" just as other boys and girls do. In short, he should be led to enjoy his home and school life, within the prescribed limits.

Even children whose activities must be rigidly restricted because of a severely damaged heart can have a wholesome interest in life and enjoy many of the pleasures of their more active associates by the intelligent planning of understanding parents, teachers, and physicians. However, rheumatic children do need special help in choosing a life work which will give them the best chance of avoiding recurrences of acute infection.

In ordinary rheumatic fever, then, the physician treats the infection while it lasts, which may be a long and trying time. When that has passed, frequent medical examinations and a program of rest, play, sunshine, and plenty of wholesome food will help to build up the child physically, so that he is better able to ward off sickness.



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## RHEUMATIC FEVER

### What It Is

While the specific cause of rheumatic fever has not been discovered, several of the factors associated with it and its onset and recurrence are now generally recognized.

Rheumatic fever is serious because it may affect the heart. Age is important. Rheumatic fever usually begins in childhood at about age 5 or 6, although adults may have it. There is a susceptibility to the disease which causes rheumatic fever to be more common in some families than others. The other factors which may favor its onset, combined with an individual susceptibility, are frequent chilling, damp or overcrowded living quarters, and a poor diet.

It is also known that one attack of rheumatic fever does not protect a child from future attacks as, for example, one attack of measles does. On the contrary, rheumatic fever tends to recur. Repeated attacks are more likely to damage the heart. It is not communicable as chickenpox and measles are, and there is no danger of catching it by being in contact with a child who has it.

The immediate forerunner of the first attack or a recurrence may be a respiratory streptococcal infection—scarlet fever, a bad cold, or tonsillitis—occurring from a few days to about four weeks before rheumatic fever sets in.



### How It Begins

The early signs and symptoms of rheumatic fever may be slight. Some of them, which may occur singly or in combination, are: failure to gain weight, poor appetite, pallor, repeated nosebleeds, low persistent fever, and frequent complaints of pain in the arms, legs, or abdomen. These symptoms do not necessarily mean that a child has rheumatic fever, but they do indicate that he is below par and should be examined by a physician who may wish to seek the advice of a specialist and make use of diagnostic aids.

The more characteristic signs include painful, inflamed joints. The child may be irritable without good reason, cry easily, or develop other nervous habits. Chorea, usually known as St. Vitus's dance, which causes uncontrollable twitching or jerking of the face, arms, or legs, is a less frequent manifestation.

### The Damage to the Heart

Some children recover from rheumatic fever without developing heart trouble, or the heart damage may be so slight that the child can live a normal life. In other cases, the child recovers from the acute attack but is left with an impaired heart. Or the acute attack may be severe enough to overwhelm the heart and cause death.

Recent studies of children observed many years after an attack of rheumatic fever show that the majority are alive and able to live a normal life, in some cases with limitation of their activity, depending upon the amount of damage to the heart.

### What to Do for the Child

It is vitally important to spare the heart unnecessary work for as long as the disease is active and for the period of convalescence afterwards. A child with rheumatic fever should remain in bed until, in the physician's opinion, it is safe for him to get up. The physician is the only one whose judgment can be relied upon in this matter, and his directions should be followed *exactly*, no matter how well the patient feels or how slight the attack seems.

Good nursing is important for rheumatic fever patients. In communities which have visiting nurse service, a visiting nurse can give help of great value to the patient and to the doctor.



### Convalescent Diversions

If convalescence is long, it may become quite a problem to keep a child reasonably contented in bed. First of all, he should be helped to understand that staying in bed is temporary, and that the things he can do later on depend largely on doing now what the physician wants him to.

If a visiting nurse is coming in, she may be able to help find ways to keep the child occupied. She will know of other services available to bedridden children, such as visiting teachers who help a child with his school work, and other trained workers who teach games, handicrafts, and all sorts of skills and amusements. Where these services are not established, the regular school teachers and local librarians are often glad to suggest ways of keeping a child occupied within the activity limits the physician allows.

Most homes have on hand a good many simple things which can keep a restless child busy for hours. Old magazines, mail-order catalogs, and wall-paper sample books furnish good cutout material. Wrapping paper, ironed smooth, can be used for scrapbooks. Flower cutouts can be pasted on wastebaskets, trays, etc., for the child's bedroom. All sorts of amusing "animals" can be made by letting a child stuff old stocking legs, tie them into desired shapes, and embroider faces on them. Paper jumping jacks can be made and tied to the end of the bedpost where the child can pull the string. These are only a few of the opportunities for amusement that can be provided without much expense. Sitting up in bed can be made more comfortable by using a washboard, enclosed in a pillowcase, for a prop.

### Preventing Recurrences

Many children have only one attack of rheumatic fever, but others go on having them. During the teens, recurrent attacks often become fewer and fewer and, in many cases, at about 15 or 16 years of age they stop altogether. Most attacks in adults are believed to be recurrences of attacks which began in childhood.

It is important to do everything possible to prevent recurrences. If they can be avoided, the damage to the heart may in time be wiped out or become so slight that the child can live a life of normal activity.

The child should keep in good condition by eating enough of the right kinds of foods, by getting enough rest, play, and sunshine, and by doing everything possible to build up resistance. The utmost care should be



taken to avoid respiratory infections, since they frequently precede both the first attack and recurrent attacks of rheumatic fever. The child should keep away from anyone with a cold or sore throat and be careful to protect himself against chilling and getting wet. He should have frequent medical check-ups. It has been found, in some cases, that certain drugs are useful in preventing recurrences. The physician may prescribe such treatment.

### Living a Normal Life

The child who has had rheumatic fever, with some degree of heart damage, should not be coddled but should be led to enjoy his home and school life, just as other boys and girls do. While it is important to provide the child with healthful surroundings and to encourage him in healthful living habits, harm can be done by overemphasizing the physical handicap.

If serious heart damage exists, and his activity is limited, he must learn to stay within these limits. But even children whose activities must be rigidly restricted because of a severely damaged heart can have a wholesome interest in life and enjoy many of the pleasures of their more active associates by the intelligent planning of understanding parents, teachers, and physicians. However, rheumatic children do need special help in choosing a life-work which will give them the best chance of avoiding recurrences of acute infection.

With care in choosing work and play, people with rheumatic heart disease, even many with severely damaged hearts, can live reasonably active and useful lives.



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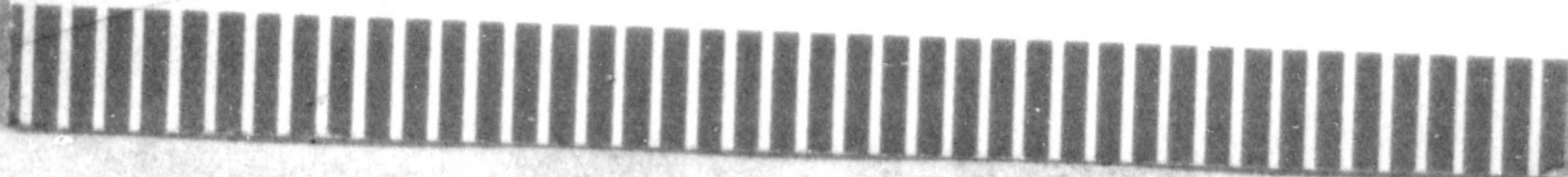
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# RHEUMATISM

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and later to thinning of the bones at the joint. In osteoarthritis the changes which take place in the joint are degeneration of cartilage and overgrowth of bone.

**WHAT CAUSES IT.** The onset and development of both forms of arthritis are related to the health of the body as a whole, much as seed is related to the soil in which it grows. Anything that weakens the constitution—prolonged mental or physical strain, exposure to cold or wet, poor food habits, chronic constipation, or poor body mechanics—may furnish favorable soil for the seed, or exciting cause, of arthritis. A tendency to develop arthritis also may run in families.

### RHEUMATOID ARTHRITIS

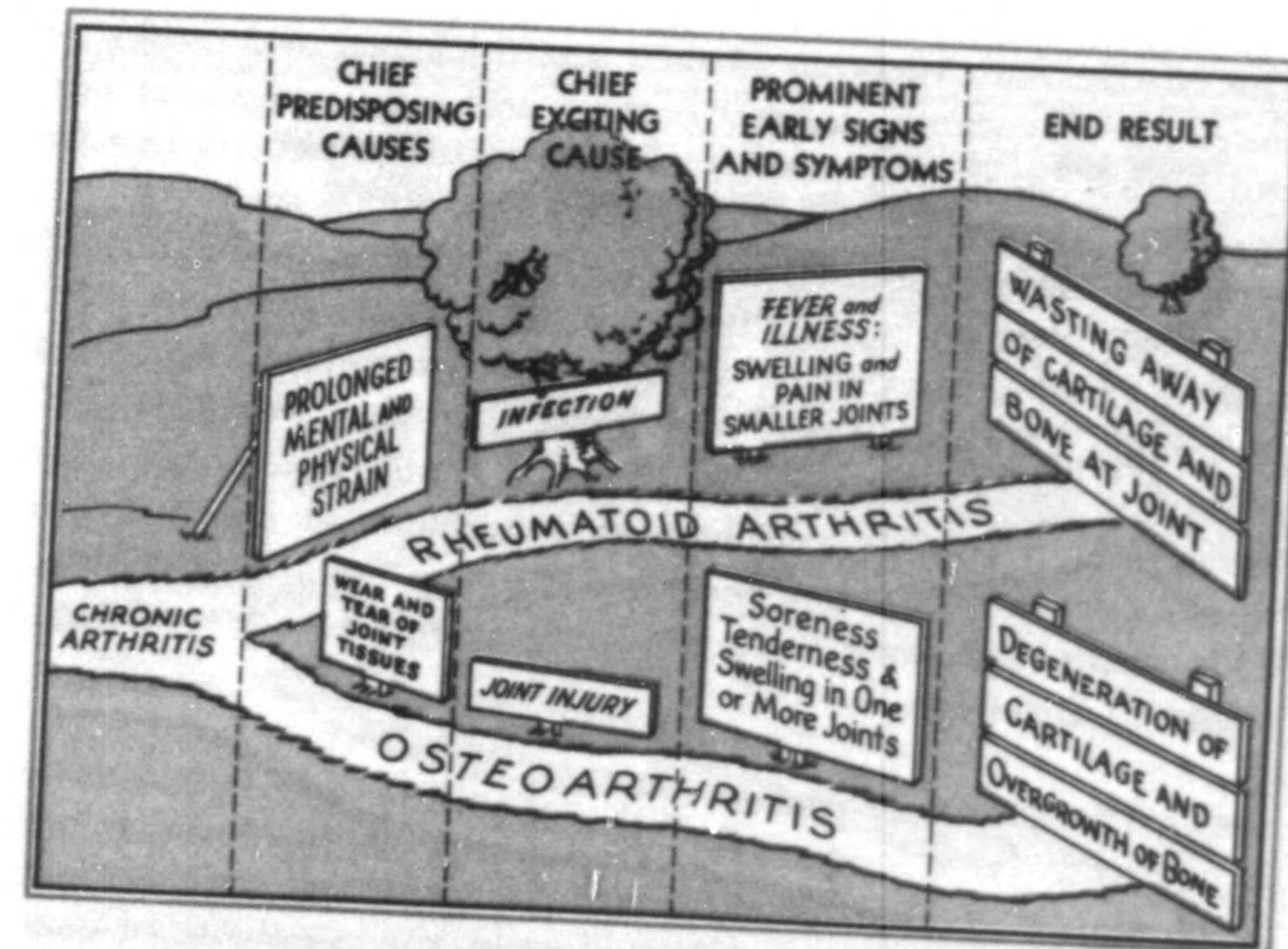
Rheumatoid arthritis begins, as a rule, before age 40, and infection appears to play an important part in its onset. Frequently the exciting cause is a localized infection in the teeth, tonsils, nasal sinuses, genito-urinary tract, or intestinal tract. Exposure to cold and dampness, severe nervous strain, or injury to the affected joint may bring on an attack.

Before definite symptoms of rheumatoid arthritis appear, the person attacked may have a feeling of being below par. He may find his daily task hard, his appetite poor, his digestion not so good as usual, his bowels disordered. He may notice that he has less color than before and that he is losing weight.



Active disease may begin suddenly with fever and inflammation of several joints, or it may develop slowly with swelling, pain, and stiffness involving one joint after another. The joints in the fingers and feet are usually affected first.

Frequently there are periods of fever and illness when fresh joints become affected, followed by periods when the disease is inactive. If untreated, rheumatoid arthritis may progress until finally perma-



nent stiffening of the larger joints results in varying degrees of helplessness.

### OSTEOARTHRITIS

Osteoarthritis is essentially a disease of middle and old age. It rarely occurs before age 50. It is the result of wear and tear of the joint tissues and because of this fact appears first in the joints which receive the hardest usage. The most common immediate cause is injury to a joint or to several joints.

Changes in the condition of the joints may take place gradually over a period of years, and as a result the joint tissues become weakened and less elastic. It is believed that repeated minor injuries are partly responsible for this. After the age of 50 the joints do not stand strains so well as they did in youth, and even a slight injury may set up osteoarthritis.

Osteoarthritis often attacks hale, well-nourished people. The onset is usually gradual. The person affected may first notice tenderness and soreness in one or more joints. The joints of the fingers and thumb may be attacked first, or one or more of the large joints—for example, the hip or knee—may be involved.



The affected joint becomes swollen and thickened and creaks or grates on movement. It may become stiff after periods of rest and loosen up during periods of activity. The pain is usually moderate but may become severe when the joint is overused.

Osteoarthritis is a much less crippling disease than rheumatoid arthritis. After proper treatment the person may have no more pain and may regain more or less ability to use his joints according to his age. But when the disease is not treated, it may grow progressively worse. Small loose pieces of bone and gristle may develop in the joints and hamper movement as effectively as would a small steel wedge caught in the gears of an automobile. This obstruction may make the sufferer feel unsafe and may suddenly throw him.

**WHAT TO DO FOR ARTHRITIS.** The first thing to do is to consult a physician *before* severe damage has been done to the joints. Little can be done after the joints are deformed permanently. When proper treatment is obtained early, the possibility of complete recovery is strong and the likelihood of improvement and relief is almost certain.

In general, the relief which the sufferer from arthritis can obtain and the extent to which crippling and deformity can be prevented depend largely upon the patient and his willingness to cooperate with his physician. Specific treatment will depend upon the type of arthritis from which the patient is suffering, but the restoration of general good health will have much to do with his chances of recovery. Probably the physician will suggest a plan of living for the patient to follow. Perseverance in following this plan is of the utmost importance. Even when improvement is slow he should not give way to anxiety and discouragement. Peace for the mind is as important to recovery as is rest for the body.

The factor of infection is not so closely related to osteoarthritis as to rheumatoid arthritis, but, in either case, the physician will probably have a thorough search made for abscessed teeth, infected tonsils, or any other focus of infection that may be lowering general physical resistance or acting as the exciting cause of the trouble. Since localized infections are always possible causes of

ill health, physicians may advise their eradication when it is possible to do so.

Certain adjustments in the diet may be prescribed, depending upon whether or not the patient's weight is normal for his type, weight, and age. Patients who are anemic and underweight need building up with plentiful amounts of foods selected to meet their individual needs and to supplement any medication the doctor may advise. Milk, vegetables (especially the green-leaf varieties), whole-grain or enriched cereals and bread, eggs, butter, and meat should all be included.

The physician also may advise getting additional vitamins in concentrated form if he feels that the patient needs them.

If the patient is overweight, as is often the case in osteoarthritis, he may feel better if his weight is gradually reduced to normal under the guidance of his physician. The diet should include all the food elements essential to health but should be low in calories.

To avoid or to correct constipation it is important to drink plenty of water; to eat laxative-producing foods—whole-grain bread and cereals, dried fruits of various kinds, and green-leaf vegetables; and to establish the habit of regular elimination.

The physician will probably check the patient's posture and give instructions for the correction of defects if any are present.

Rest and the avoidance of overexercise of the affected joints is important. It may be necessary to protect the joints from painful motion by bandages and splints. In some cases the patient

#### To Prevent Chronic Arthritis

1. Keep weight normal for height, age, and body build.
2. Get enough rest and sleep.
3. Try to maintain good posture.
4. Exercise daily, but guard against joint strain and injury.
5. Wear enough clothing to keep warm and dry outdoors in cold, wet weather.
6. Consult a physician if you take cold often.
7. Eat a variety of foods daily, including those which are rich in vitamins, minerals, and roughage.
8. Guard against worry.
9. Have regular medical and dental examinations.



may be encouraged to use the joints gently, as long as they do not hurt or do not become stiffer the day after use.

The application of heat to the joints with hot packs or electrical bakers, combined with massage of the muscles above and below the joints, increases the supply of blood to the joints, but treatments of this kind (physiotherapy) should be applied only under the supervision of a physician. If the joints remain crippled after the disease itself has been stopped, surgery may be used to make them more useful and less painful.

Vaccines in the past have been much abused but they may be beneficial for rheumatoid arthritis when employed by an experienced physician. In osteoarthritis, vaccines are of very doubtful value.

No drugs should be used without consulting the doctor. Patent medicines which promise quick relief from chronic arthritis do not cure the disease and may make it worse. The doctor may prescribe drugs to relieve pain, but they will not cure the disease.

The doctor will probably suggest periodic check-ups on the health, including X-ray examinations and laboratory tests.

#### MUSCULAR RHEUMATISM OR MYOSITIS

Myositis is an inflammation of the voluntary muscles which produces tenderness, pain, and stiffness. An attack of myositis may either be short and sharp or mild and prolonged. Almost any muscle or group of muscles may be affected, but those usually involved are the muscles in the back of the neck, those in the lumbar region of the back, or those of the shoulder and arm. The affected muscles hurt chiefly or only when they are being used.

The commonest cause of acute myositis is muscle strain resulting from overuse of a muscle or group of muscles. The effect produced is similar to the muscular soreness and stiffness experienced after unusual or vigorous exercise. The chronic form of myositis may be associated with chronic arthritis and may lead to the wasting away of the muscle group involved.

Myositis yields most readily to rest, heat, and massage under the direction of a physician. In chronic cases it may be necessary to build up the health and to look for and eliminate foci of infection as in the general treatment of arthritis.



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# RHEUMATIC FEVER IN CHILDREN

ITS RECOGNITION  
AND  
MANAGEMENT

*Approved by*

The American Heart Association  
The American Academy of Pediatrics  
The Children's Bureau of the  
United States Department of Labor  
The United States Public Health Service

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# RHEUMATIC FEVER IN CHILDREN

ITS RECOGNITION AND MANAGEMENT

*In war or peace, rheumatic fever ranks high among the more serious, unsolved problems which stand as a challenge to the medical profession and other health workers. I am certain that the brochure, "Rheumatic Fever in Children—Its Recognition and Management," will form a valuable contribution to this subject. I sincerely hope that it will be widely read and wholeheartedly endorsed by members of the public health profession.*

THOMAS PARRAN, M.D.

*Surgeon General, United States Public Health Service*

This text was prepared by George M. Wheatley, M.D., Assistant Medical Director of the Metropolitan Life Insurance Company, in consultation with the organizations listed on the cover, the individuals cited on the opposite page, and the Medical Staff of the Company.

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### FOREWORD TO THE FIRST EDITION

**A**LTHOUGH physicians generally are well acquainted with the characteristic manifestations of rheumatic fever and the tragic role it plays in the causation of heart damage in children, it seems desirable to refocus medical attention on the protean aspects of the disease and its management at a time when major shifts in population, overcrowding in war-production areas, and other disruptions of peacetime economy favor an increase in its incidence and crippling after-effects. It is hoped that the influence of such predisposing environmental factors may be counteracted by sounding the alert so that an especially careful watch may be maintained.

### FOREWORD TO THE THIRD EDITION

#### *Rheumatic Fever in Young Adults*

**S**INCE the first printing of this brochure about 18 months ago, some 90,000 copies have been distributed to physicians in civilian and military service and to public health nurses. During this period, as a result of the selection and preparation of our young civilian population for military service, new and valuable experience with rheumatic fever has accumulated. In preparing the third printing of this brochure it seemed appropriate briefly to discuss this current experience with rheumatic fever in young adults.

Rheumatic heart disease is by far the most frequent finding among individuals rejected because of cardiovascular defects by the Selective Service system. Based on reports of the Selective Service system, approximately 50,000 registrants of the first 2,000,000 examined were unqualified for general military service because of rheumatic heart disease. In Boston and New York, about one half the cases with rheumatic heart disease who were subjected to special review had a history of rheumatic fever or chorea in childhood.

Many cases of acute rheumatic fever have been reported from our armed forces. Studies of current cases among naval personnel show a relatively high concentration among the younger enlisted men. It appears that susceptible individuals are usually attacked shortly after reporting for duty at training stations. A sizable pro-



portion, about 40 percent, give a history of rheumatic infection in childhood. The seasonal distribution of the cases is rather typical, the peak being reached in the late winter and early spring. In the great majority of cases there is a history of recent upper respiratory infection or of scarlet fever; in the case of some of those stricken in battle areas there is a history of severe exposure or of prolonged immersion. A few of the latter have occurred in the Tropics, where the disease is reputedly infrequent. It is an interesting fact that the original area of residence of the patient appears to be of less consequence than the area in which the camp or naval station is located. Thus, rates have tended to be high in training camps in those States in which the general population normally has a high incidence of the disease.

The finding of cases of rheumatic heart disease through Selective Service medical examinations is providing a hitherto unavailable measure of the degree of infection among our male population from 18 to 40 years of age. Further studies of the outbreaks of the acute disease among military personnel will shed new light on the epidemiology of rheumatic fever. Moreover, the occurrence of cases in large numbers is providing an opportunity for better understanding of problems associated with care and rehabilitation of young adults with the disease.

This wartime experience adds to our knowledge of rheumatic fever. While it does not as yet invalidate any of the observations in this publication, it may eventually sharpen the focus or shift the emphasis upon certain aspects of the problem.

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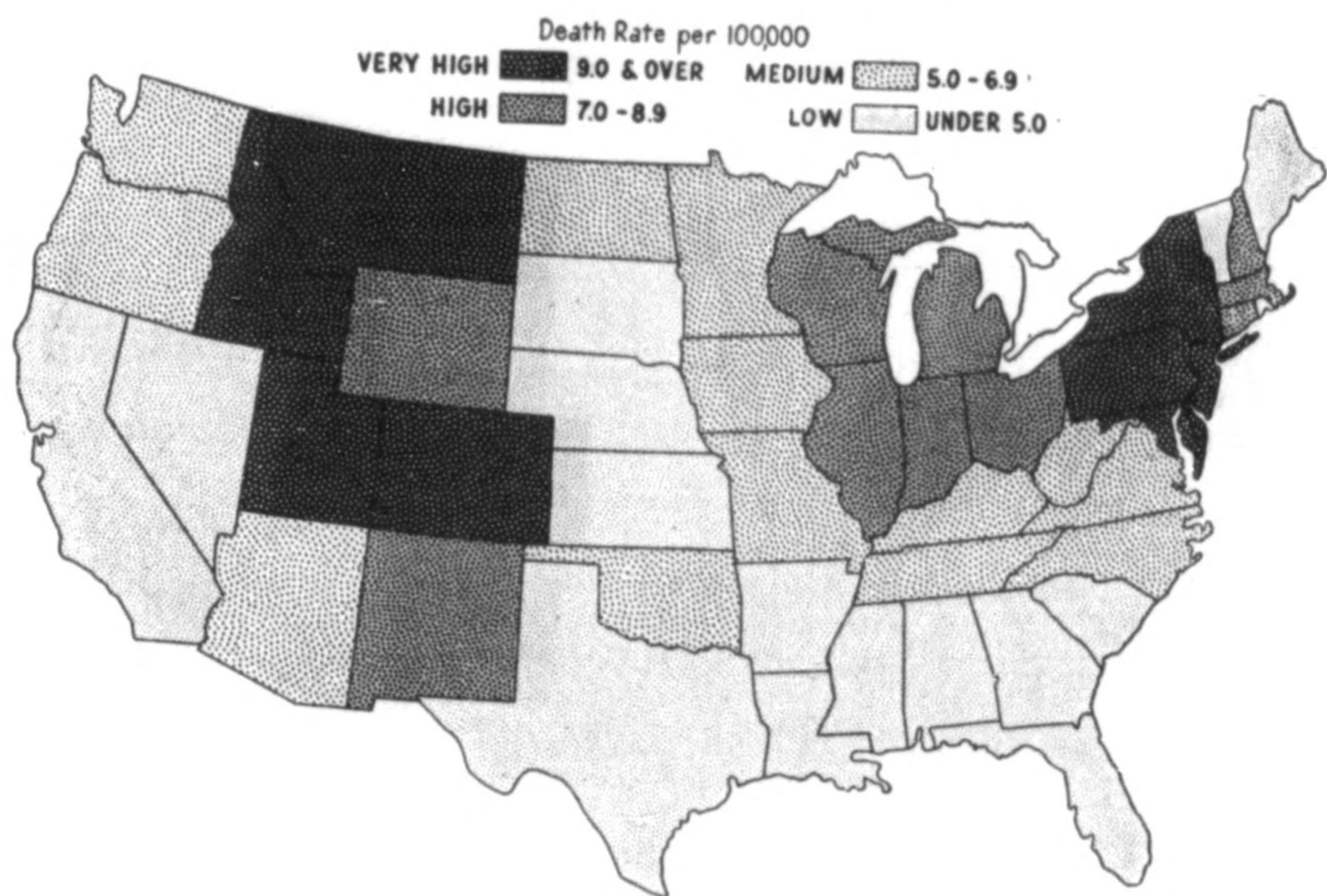
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## RHEUMATIC FEVER IN CHILDREN

### *Its Recognition and Management*

GEOGRAPHIC DISTRIBUTION OF MORTALITY FROM RHEUMATIC FEVER  
 WHITE PERSONS, AGES 5 TO 24 YEARS, UNITED STATES 1939 AND 1940  
*(Includes Chronic Rheumatic Heart Disease)*



#### *The Importance of Rheumatic Fever*

**R**HEUMATIC FEVER is generally recognized as a major public health problem in this country and, at the present time, is reportable in certain areas.\* It ranks high, not only as a cause of death, but

\*Michigan; Iowa; California; Rhode Island; the District of Columbia; Utah; Maryland; Cincinnati, Ohio; and Chicago, Ill.



also as a cause of disabling heart disease. Greater familiarity with this important affection will bring nearer the time when it will be in the group of accurately recognized and reported diseases. This brief review of our present limited knowledge of rheumatic fever is presented in the hope that it may be of some assistance in bringing about early recognition of cases, and in promoting better care of rheumatic children. The discussion of the principal features of rheumatic fever will be limited to its manifestations in childhood because (1) the disease usually begins at this period of life; (2) the early recognition and proper management of the disease at this period of life is especially difficult; (3) between the ages of 10 to 14 inclusive it causes more deaths than any other disease. Heart disease in children is due, in most instances, to rheumatic fever.

#### The Nature of Rheumatic Fever

Rheumatic fever is a systemic and probably infectious childhood disease of long duration, beginning most often between 5 and 15 years of age. Genetic studies have shown that susceptibility is on a hereditary basis. The exact role played by environment in the development of the disease in susceptible individuals is still undetermined.

The onset of rheumatic fever is often insidious and, when fully developed, the disease causes characteristic involvement of many organs and tissues, notably the heart. Its course during childhood is marked by alternating periods of exacerbation and freedom from symptoms. Cardiac damage occurs or is increased during the exacerbation, or "acute," phase of the disease. There is apparently a direct relationship between the degree of cardiac damage and the number and severity of the recurrences. While extensive permanent heart disease (especially considerable cardiac enlargement) does affect the ultimate prognosis, the severity of the individual attack of rheumatic fever is the more important factor controlling the immediate outlook. Recurrences diminish after puberty. A disconcerting fact about the behavior of this disease is that a substantial number of children and many adults are found to have definite signs of rheumatic heart disease with no previous recognizable history of rheumatic fever.

So long as the disease is active, bed rest is the most reliable method of treatment. Proper management of the disease is based upon recognizing when rheumatic fever has passed from the "active" to the "inactive" stage. When the disease is quiescent, physical activity should be encouraged within the limits of the child's capacity. In some patients the physical signs of rheumatic heart disease regress or disappear.



**Etiology**

Streptococci have long been suspected of playing a causative role in rheumatic fever, and recent studies indicate that Group A hemolytic streptococcal infections of the upper respiratory tract usually precede both the initial attacks and reactivation of the rheumatic process. The typical course is as follows: streptococcal infection; latent period of one to five weeks (average three weeks); then onset of rheumatic symptoms or signs.

The streptococcal infection may be so mild as to escape notice, or it may be severe enough to be disabling. In the first instance, bacteriological methods are required for its demonstration; in the second, it may take the form of moderate to severe nasopharyngitis, tonsillitis, quinsy, otitis media, or scarlet fever. The streptococcal infection appears to constitute the contagious element in rheumatic fever. This is indicated by outbreaks of the disease which occur in the wake of streptococcal nasopharyngitis or scarlet fever in barracks, boarding schools, hospitals, or other institutions, where many susceptible persons are crowded together.

How streptococcal infections lead to rheumatic fever is not clear; they may act synergistically with some other unknown agent, but no other has been found. About 25 percent of rheumatic subjects contracting streptococcal infections have been observed to have recurrences.

As in tuberculosis, socioeconomic factors appear to influence the occurrence of rheumatic fever. Epidemiological studies show a high correlation between the occurrence of this disease and such factors as crowded, unhygienic living conditions and poor nutrition. It tends also to be concentrated in certain families.

**Pathology**

Rheumatic fever affects the mesenchymal tissue of the body. The cardiac structures are involved, and this accounts for the seriousness of the disease. In the myocardium a characteristic formation (the Aschoff body) is an early finding in the active stage. It consists of a small, nodular collection of cells located usually about blood vessels or in the interstitial supporting tissues of the heart. In children dying of rheumatic fever, acute inflammation of the endocardium is found in practically every case. Frequently these fresh lesions are superimposed upon valve leaflets and their associated chordæ tendinæ which have been damaged by previous attacks.

Some evidence of pericarditis is found in nearly all children dying of acute carditis, yet the condition is recognized clinically in only a small proportion of rheumatic attacks.



### Diagnosis and Course

Rheumatic fever is often overlooked and confused with other diseases. Fever,\* fatigability, failure to gain, or loss of weight should suggest, especially in a child with a family history of the disease, the possibility of rheumatic fever. But sinusitis, childhood tuberculosis, undulant fever, and other subacute or chronic infections of childhood, as well as leukemia, sickle-cell anemia, and other blood dyscrasias, may produce these signs. In rheumatic fever, as in other febrile illnesses, there may be leukocytosis, an increased erythrocyte sedimentation rate, and secondary anemia. In all fevers of unknown origin the heart should be examined carefully, not only during the acute attack but for several weeks thereafter.

#### Rheumatic Manifestations

When the physician suspects rheumatic fever, he should be on the lookout for the more characteristic manifestations. Mild and fleeting pains in tendons or muscles may be due to synovitis or myositis of rheumatic origin. A limp may be due to "growing pains" or synovitis of the hamstring tendons. Heel pain from synovitis of the Achilles tendon may force the child to walk on tiptoe. Myositis of the sternocleidomastoid muscle may cause torticollis, or wryneck. The pain may be noticed in damp and rainy weather, and there may be stiffness or lameness after the affected part has been in one position for some



*Rheumatic nodules of knees, ankles, and wrists; purpuric spots on lower legs. (From MAY G. WILSON, *Rheumatic Fever*, The Commonwealth Fund, New York, 1940)*

\*Low-grade fever is not an absolute indication of illness. Body temperature variations unassociated with any recognizable symptoms of infection may occur in apparently healthy children, often following exercise. An oral reading slightly above 99° F. and a rectal reading of slightly above 100° F. need not, in the absence of other findings, be considered evidence of illness.



time. But this painful condition or inflammatory reaction in tendons and muscles may be related to other infections or to postural or orthopedic defects.

*Polyarthriti*s is not a constant feature of rheumatic fever in children. When arthritis occurs, it usually selects the ankles, knees, and wrists. The arthritis is relatively mild compared with that experienced by adults. There may be slight swelling, but the joints are rarely red or hot. It may last a few days to a week. Usually the temperature is not greatly elevated. It may range around 101° F. and generally does not exceed 103° F. Arthritis due to rheumatic fever must be distinguished from involvement of the joints in other diseases such as tuberculosis, gonorrhoea, rheumatoid arthritis, osteomyelitis, syphilis, leukemia, and undulant fever.

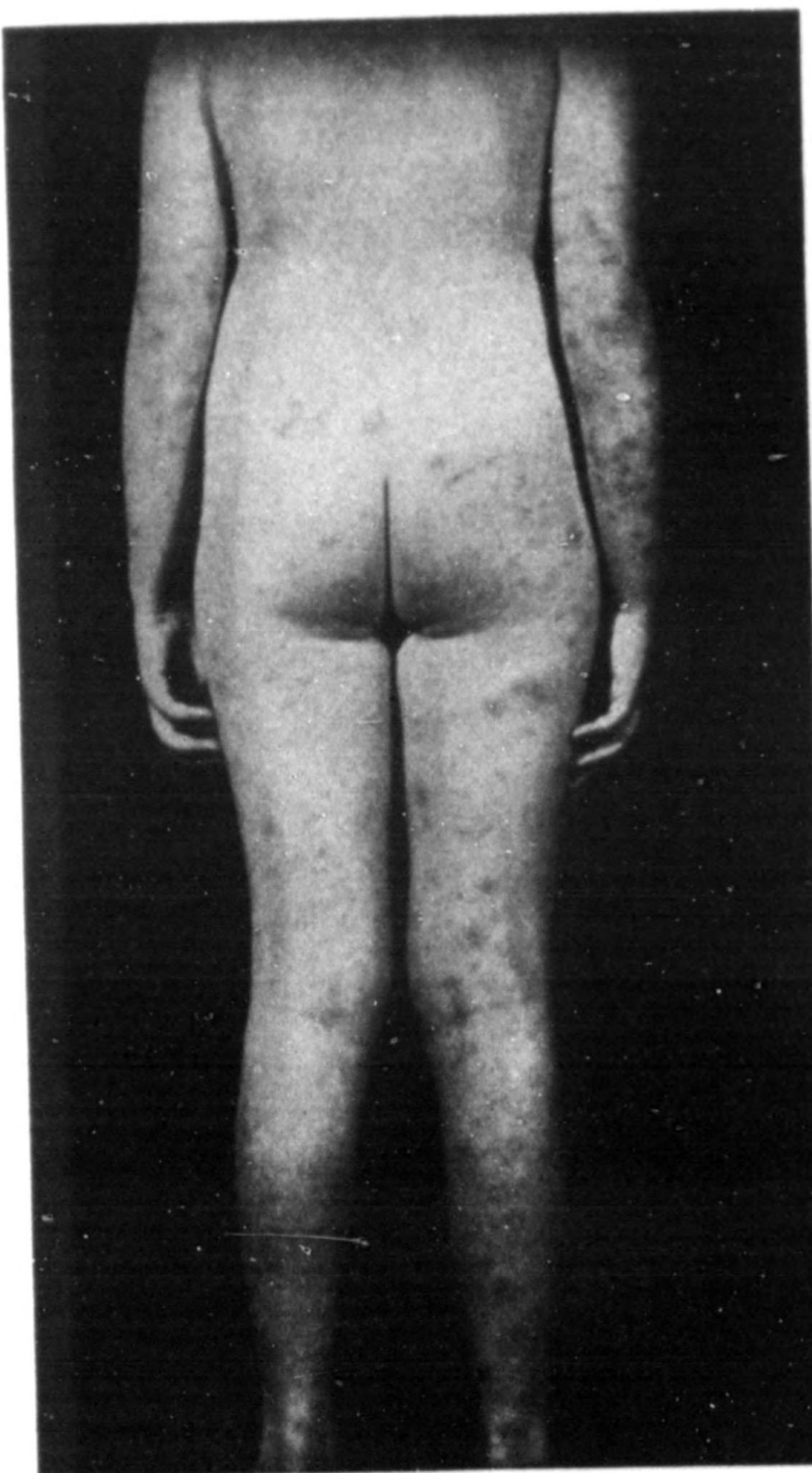
*Chorea*, as a first manifestation of rheumatic fever, occurs more frequently after 10 years of age than before. It is also rare after puberty. The onset is usually gradual. It may be evidenced first by extreme irritability. When it is severe it is characterized by sudden



*Erythema annulare* in a patient showing electrocardiographic evidence of myocardial disturbance (From MAY G. WILSON, *Rheumatic Fever*, The Commonwealth Fund, New York, 1940)



aimless, irregular movements, often accompanied by muscular weakness. Mild types of chorea may be overlooked, and the physician should be alert to the fact that even a mild attack of chorea may be associated with severe rheumatic heart disease. The course of chorea extends from about 6 to 10 weeks. The tendency to relapses and recurrences is marked. Chorea, due to rheumatic fever, must be differentiated from nervous tics or habit spasms and from choreiform movements associated with encephalitis, poliomyelitis, and birth injuries. *Nodules* almost invariably mean rheumatic fever. Usually they are discovered during the subacute stages of infection, in the deep fascia, around joints, and on bony prominences. They tend to appear in crops.



*Erythema multiforme* in a child who complained of joint pains (From MAY G. WILSON, *Rheumatic Fever*, The Commonwealth Fund, New York, 1940)

*Erythema multiforme* (usually the marginatum form), purpuric, papular, and urticarial lesions may be skin manifestations of the rheumatic process. *Abdominal pain* is a frequent complaint in rheumatic children. It may be severe enough to justify an exploratory laparotomy for an acute abdomen. However, it is a common symptom in nonrheumatic children, especially in the presence of respiratory infection. Severe abdominal referred pain may be due to an enlarged liver or acute carditis, but may be due to actual inflammatory changes in the diaphragm, peritoneum, mesentery, etc.



*Epistaxis* usually occurs in association with other rheumatic manifestations. As a rheumatic manifestation, it must be distinguished from nosebleeds due to local pathology in the nose, or from a blood dyscrasia.

*Active rheumatic heart disease* (carditis) is the term used to designate acute myocarditis, pericarditis, and valvulitis (endocarditis). The serious manifestation of rheumatic fever is heart disease. During an acute attack of rheumatic fever there is unmistakable clinical evidence of cardiac involvement in from 50 to 60 percent of the cases. Pathologic, electrocardiographic, and fluoroscopic studies suggest that the heart is affected to some degree in almost every case. Early signs of cardiac involvement may be tachycardia out of proportion to the degree of fever, prolongation of the first sound, or a soft systolic murmur heard best at the apex. These signs, suggestive of myocardial involvement, are not necessarily a bad omen. They often disappear entirely, leaving the heart without appreciable injury. The heart sounds may change in quality and assume a "tic-tac" rhythm. A mid-diastolic sound may appear which gives the heart sounds a "gallop" rhythm. Involvement of the conducting system of the myocardium is frequently shown by prolongation of the P-R interval in the electrocardiogram. Enlargement of the heart usually associated with a well-defined systolic murmur, heard over the entire precordium and often transmitted to the axilla, indicates more extensive carditis. Additional symptoms and signs of active carditis are prostration, weakness, dyspnea, diminished vital capacity, cough, precordial pain, and, eventually, other evidences of congestive heart failure. Early right-sided failure is often missed. The clue is an enlarged liver and increased venous pressure.

Pericarditis is not often recognized clinically. It may give no signs whatever, or the rub may be transient. Evidences of acute pericarditis seldom last more than a week or two. The classical to-and-fro leathery sound of a friction rub, originating close to the heart, may be audible only during one phase of the cardiac cycle. It may be heard at any point over the precordium.

In the majority of cases of active rheumatic carditis recovery takes place, but the heart may be left partly crippled. When carditis is sufficiently marked to give rise to clinical symptoms, the inflammation leads to scarring of the valves, resulting in some degree of permanent deformity. In some cases of rheumatic fever inflammation of the valves may be so mild, and recovery so complete, that there are no signs of valvular deformity. Improvement may continue for some time after the attack, making it difficult to estimate the amount of permanent damage. When the disease is inactive the only trace of rheumatic fever is found in the heart. The most frequent sign—cardiac murmurs—is due to thickening of the valves. The size of



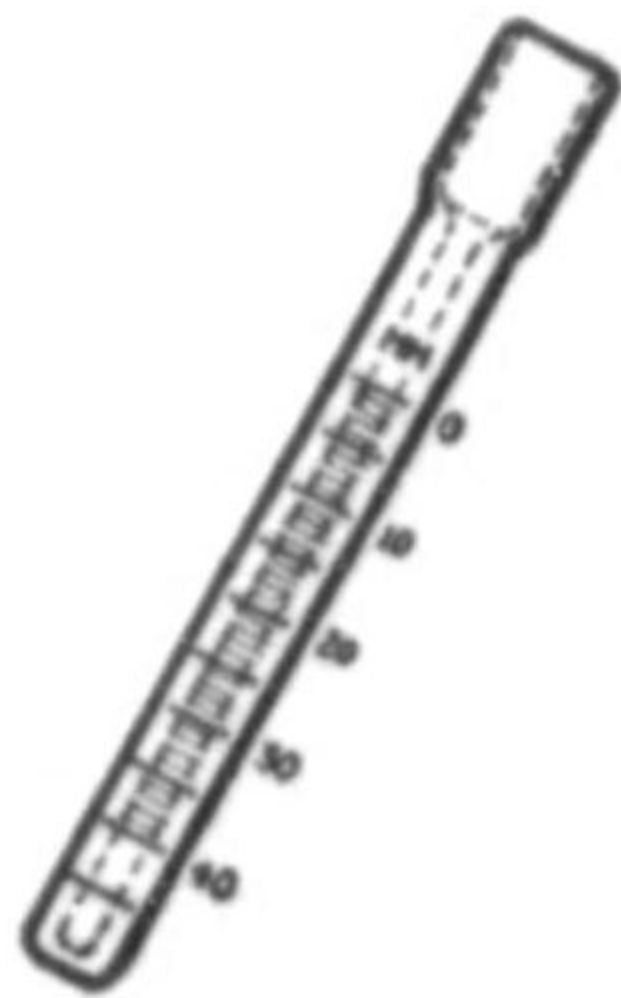
the heart seldom returns quite to normal. This may not be appreciated without a three-positional X-ray or fluoroscope examination. The end stage of carditis is chronic rheumatic heart disease.

*Chronic rheumatic heart disease* is the only recognizable sign of rheumatic fever in its inactive stage. It is frequently discovered or suspected in the course of a periodic medical examination.

The evidence of chronic rheumatic heart disease in children does not differ markedly from that found in adults. However, distinctions are possibly worth noting. Because cicatrization of the valves requires weeks and months to develop, the extreme valvular deformities of mitral stenosis and aortic stenosis are generally found in adolescents and adults and are uncommon in childhood. The systolic murmur of mitral insufficiency is the most common early sign of mitral disease. Mitral stenosis takes time to develop, usually not less than six months. In children, heart failure is usually due to a fresh carditis rather than to a weakened myocardium without active infection.

Aortic insufficiency, which is not so common as mitral insufficiency, is unusual in childhood but does occur. It usually develops insidiously. The rapid development of aortic insufficiency is considered a grave sign. Auricular fibrillation is less frequent in children than in adults, even when severe congestive failure is present. Deformity of the chest is more marked when the heart is involved in early life. Growth and nutrition are more likely to suffer, anemia may be present, and puberty is often delayed.

**Course of  
Rheumatic Fever  
in Children**



In children, the course of rheumatic fever may vary considerably. The attack may be terminated in a few weeks and leave behind no evidences of cardiac damage; or there may be a fulminating process which overwhelms the heart. It may present the picture of polyarthritis and moderate fever, which subsides only to be followed by frequent recurrent attacks of the disease with familiar manifestations until the ultimate damage to the heart is considerable. After puberty, attacks tend to diminish in frequency and intensity. The usual course is characterized by recurrences of any or all of the manifestations in successive years or after varied periods of freedom from symptoms. This characteristic of the disease has led to a recognition of so-called *active* and *inactive* phases.

While the active phase may vary widely in the individual case, in children the usual duration, from the onset of manifestations to the inactive phase, is about six months. It is reasonable to suppose that the less strain put upon the heart, the less damage the organ is likely to suffer; therefore, bed rest is indicated for at least two weeks after



all signs of the acute attack have subsided and remain absent without salicylates. Bed rest also gives the advantage of lessened risk of exposure to upper respiratory infections.

Antipyretics and analgesics ameliorate symptoms, but probably have no effect on the rheumatic state itself. They may be useful as a therapeutic test. Because symptoms and signs are masked by salicylates, the salicylates should be discontinued, as already implied, before judging that active infection has subsided.

One of the most difficult problems associated with rheumatic fever is that of determining when the child has reached the inactive phase of the disease. Symptoms, physical findings, and laboratory data must be interpreted in arriving at this clinical decision. Any rheumatic manifestations indicate continued activity, but, in particular, the signs and symptoms of carditis mean that the process is still active. Conversely, any improvement in the signs and symptoms can be interpreted as meaning that the process is becoming quiescent. As cardiac function improves, a murmur may become more distinct. There is little use in employing laboratory data while there are symptoms and physical signs of activity. When these have disappeared the erythrocyte sedimentation rate, the leukocyte count, atrioventricular conduction as revealed by electrocardiogram, vital capacity, or the patient's dyspnea on exertion may be helpful tests in determining whether the disease has run its course (see "Laboratory Aids in Recognition and Management of Rheumatic Fever," pages 20-21). But laboratory data must be evaluated with the clinical picture, because these tests are not specific for rheumatic infection. They are of most value when studied in relation to the patient's original tests and the normal rates for such tests. The basal pulse rate during sleep is a useful test. An increased pulse rate under such circumstances, even in the presence of normal laboratory findings, usually means continued rheumatic activity. Gain in appetite and body weight are useful signs of improvement.

#### Prognosis

Probably the most important factors in the prognosis of rheumatic fever are the presence or absence of active carditis, the degree of permanent heart damage, the frequency and number of attacks, and the age of the patient. The prognosis is poorer for cases with onset in early childhood than for those with later onset. The outlook is distinctly poorer for those having active carditis with each recurrent attack of rheumatic fever. It is worthy of note, however, that there are numerous cases of serious heart disease, unquestionably of rheumatic origin, but without any history of either rheumatic fever or chorea.

Conclusions with regard to the prognosis of rheumatic fever must necessarily be tentative because of lack of knowledge regarding the



incidence of the disease and its varying degrees of severity. There is a general feeling now that the worst side of the picture has received too much emphasis. The frequency and degree of residual heart damage (vital factors in the prognosis) have been discussed earlier (see page 11). Without question, the duration of life is likely to be short for many cases, particularly in children whose general condition is poor and who, therefore, cannot withstand subsequent attacks of rheumatic fever or acute infections, such as pneumonia or pertussis. On the other hand, some cases with marked cardiac involvement during the acute stage improve so much that evidence of heart disease is not recognizable later.

Individuals with rheumatic heart disease or with congenital heart disease are especially susceptible to subacute bacterial endocarditis. A prolonged and unexplained attack of spiking fever in a patient with rheumatic heart disease should make one suspect this complication. A careful search for petechiae and splenic enlargement should be made and blood cultures repeated at intervals. Negative cultures may be obtained early in this disease, but as it progresses bacteriemia becomes constant and the number of organisms in the blood increases steadily.

Certainly a significant proportion of rheumatic fever patients escape serious heart damage, and the outlook for them is excellent. Life insurance studies have shown that among young adults with a history of a single attack of rheumatic fever, but with no evidence of heart disease at examination for insurance, the mortality is little above normal. Even among those with a history of multiple attacks, but without heart involvement, the mortality—though higher—is not so great as to debar them from insurance, at some advance in premium. Indeed, it is no higher than that associated with other frequent impairments or with certain common occupations.

Persons with rheumatic heart disease can and often do have active and useful careers, and those with a mild impairment who take proper care of themselves can live as long with the disease as if they did not have it. In any case, careful medical supervision following attacks and suitable limitation of activity, where definite impairment exists, can greatly improve the outlook for victims of rheumatic fever.

#### **Care of the Patient with Rheumatic Fever**

The successful management of rheumatic fever depends not only upon the use of medication or other specific therapeutic agents, but also upon the availability and utilization of certain facilities and special skills at appropriate stages of the disease. Proper care in most cases is divided into three stages: (1) care for the acutely ill child which can usually be given best in a hospital or in a sanatorium where there are adequate facilities for the care of acute illness;



(2) "sanatorial-type" care either at home, in a foster home, or in an institution (this type of long-time care is required during the less acute phase of the disease, when the child still needs to be in bed but should not be in an acute hospital where the risk of intercurrent respiratory infection is great); (3) follow-up care when the disease is inactive.

Acute disease hospitals are reluctant to tie up their facilities by caring for rheumatic patients beyond the acute stage. On the other hand, the home situation may be very unsatisfactory for the care of the child during the subacute and convalescent stages. Under such circumstances it may be possible to arrange to have the patient cared for in a foster home or sanatorium for rheumatic children. In a gradually increasing number of communities, especially where programs have been organized to care for children with this disease, institutional facilities have been made available. In some places children's tuberculosis sanatoria have been converted to this purpose.

**Treatment  
During  
Active Stage**



At present the treatment during the active stage of the disease consists of relief of symptoms, bed rest, and maintenance of nutrition. No specific measures are available to combat the infection itself. Heat therapy, foreign protein shock, convalescent serum, sulfanilamide, high vitamin diets, and multiple transfusions have been suggested and tried without significant results. In fact, sulfapyridine and sulfanilamide are distinctly contraindicated during the active stage of the disease. General medical and nursing care, cheerful and comfortable surroundings, and nourishing food are essential features of successful management during the long siege of illness. If the patient is cared for at home and a private-duty nurse is not available, the services of a visiting nurse may be obtained from the local visiting nurse association or from the city or county department of health.

*Salicylates* are the most useful drugs during the active stage. They relieve fever, joint swellings, muscle pains and tenderness, and related symptoms, but there is no evidence that they shorten the duration of the infection or limit its spread. Because of the masking effect of the salicylates on symptoms, it may be difficult to determine the presence of rheumatic activity when the patient is under their influence. If there is reason to test for activity the drug should be withdrawn for at least 10 days. So beneficial is the action of salicylates that some authorities feel that, in the presence of symptoms which suggest acute rheumatic fever, the drug may be used as a therapeutic test. Some children dislike sodium salicylate because of its sweetish taste, but will readily take aspirin.



*Treatment  
of  
Carditis*

Heart failure in children with rheumatic heart disease is usually not due to mechanical factors. The young heart fails because of the severity of the initial cardiac involvement; or the previously damaged heart fails because, in the face of a subsequent attack, its reserve is inadequate. Perhaps this explains why the child is less likely to develop generalized anasarca and extreme evidences of chronic passive congestion of the viscera, while dyspnea and pain are usually more prominent. Right-sided heart failure with dyspnea is the most common.

It may be necessary to relieve the precordial pain and distressing cough associated with acute carditis by the administration of codeine and morphine. Paracentesis is usually unnecessary for pericardial effusion. A rapid accumulation of fluid sometimes requires a pericardial tap to relieve symptoms of cardiac compression. It is important and often difficult to distinguish between enlargement of the heart due to carditis and that due to accumulation of pericardial fluid.

Digitalis should be used only when there are obvious and progressive signs and symptoms of congestive failure. The correct dose must be determined individually and medication must be given cautiously. The administration of digitalis should be studied by frequent bedside and electrocardiographic observations. The usual amount of standardized digitalis for full effect is approximately 0.15 cat unit per pound of body weight given in 24 hours. This is followed by maintenance doses of 0.1 to 0.2 gm. or 1 to 2 cat units per day.

Some observers have also found that diuretic drugs relieve the congestive failure associated with carditis and employ diuretics in preference to digitalis. Mercurial diuretics administered intravenously or in the form of suppositories once or twice weekly, preceded by the administration of ammonium chloride for several days, has been found very effective. Other workers have found that xanthein diuretics punctuated at times by mercurials are most effective.

In chorea, mental as well as physical rest is the most important part of the treatment. Sedation is usually required. In most children, sodium bromide combined with chloral hydrate or phenobarbital will prove adequate. In certain cases artificial fever therapy is beneficial.

*Care During the Less Acute Stage*

It is very important to appreciate the psychological problem associated with the prolonged bed rest necessary in the great majority of cases. One of the best ways to obtain cooperation and a healthy psychological reaction to physical restriction in children is to stress the fact that restriction is temporary and imposed in the hope of allowing more completely normal activity later.



It is essential that provisions be made for children to have schooling continued at home except during periods of acute illness. A number of States provide home teachers for children who are receiving "sanatorial type" of care in their own homes or in foster homes. Occupational therapy administered by an occupational therapist or home teacher under the physician's supervision is also important in assisting the child to make a satisfactory adjustment to his illness.



Resumption of activity should be gradual and the patient observed for signs of rheumatic activity which, if present, indicate that the patient should again be put on complete bed rest. Allow the child to sit in a chair for a half hour twice daily for one week. During the next week increase this time allowance by 15 minutes daily until the rest periods in bed are equivalent to a long nap in the afternoon. At the end of two weeks give bathroom privileges and increase the exercise periods of 15 minutes daily for from two to three weeks. The average duration of active rheumatic fever is about six months, but some cases will run their course in about a month and others will persist for two or more years.

#### Summary—When Rheumatic Fever Is Active

*Bed rest for the duration is the only known way to minimize heart damage. This may involve many weeks, even many months, and occasionally more than a year in bed.*

*Employ medication or other therapy when indicated to relieve distress, arrange for good nursing care and occupational therapy, if possible, and stress the importance of cheerful, comfortable surroundings, and a nourishing diet.*

*Emphasize that restriction is temporary and is imposed to allow more nearly normal activity later.*

*Protect the patient, as far as possible, from respiratory infection.*

*When the active stage subsides, permit gradual resumption of physical activity, first from bed to chair, then walking, and finally school.*

#### Follow-up Care During the Inactive Stage

A characteristic feature of rheumatic fever in children is its tendency to recur. Therefore, while it is important to establish whether or not the heart has been permanently damaged as a result of an acute attack, it is equally important to arrange for the patient to be examined at regular intervals for evidence of recurrence and to make every effort to improve his nutrition and living habits. Living



conditions in homes where rheumatic fever is found are frequently unsatisfactory. If a child from such a home is cared for in a hospital or foster home during the active stage of the disease, it is desirable to attempt to improve, as far as possible, the home condition before the patient returns. The services of the social worker and the public health nurse are often needed to bring about the necessary adjustments. The public health nurse may also be of assistance in supervising home conditions and prompting the family to keep the patient under medical observation.

#### Medical Supervision



The medical supervision given the rheumatic individual is essentially the same as the good medical care which should be given to every child. If anemia is present the patient should be treated for it, and known foci of infection should be removed. However, the routine removal of tonsils and adenoids should be discouraged. If there is a history of sore throat or tonsillitis, swollen cervical glands, otitis media, or obvious obstruction or disease, removal is of course desirable. If the operation is to be performed, it is important to operate when, and only when, active rheumatic fever is absent.

A child with rheumatic heart disease should not go through a surgical procedure or dental extraction without receiving chemotherapy to prevent streptococcal infection. As in all occasions when chemotherapy is employed, precautions should be followed to detect toxic effects.

#### Exercise



There is no hard and fast rule to determine the amount of exercise that should be permitted in the inactive stage in the care of children with rheumatic heart disease. There is no advantage in continuing complete rest longer than two to three weeks after the rheumatic fever becomes inactive; to do so is only to encourage invalidism and perhaps impede the return of maximum cardiac function. Some clinicians use the vital capacity as a guide in judging the tolerance to exercise. Others believe that standardized exercise tests are useful if the result can be compared with prior performance. In Appendix B is given the functional and therapeutic classification recommended by the New York Heart Association in grading the functional capacity of the patient's heart and the amount of exercise allowable. Older children can often be allowed to regulate their exercise themselves, since dyspnea will usually automatically check over-exertion. Of course, this does not always hold true. Some children



who are too eager may require restraint; while others slip easily into the role of an invalid and need to be stimulated. Games and other interesting activity should be selected to encourage the patient without subjecting him to the strain of competitive sports or the drudgery of purely mechanical exercise. Only a very small percentage of children at adolescence are found to have sufficient permanent heart disease to preclude normal activity. For this relatively small group, vocational guidance and occupational training should be provided.

*Education*—The vast majority of children with inactive rheumatic heart disease can and should attend regular schools and should engage in normal school life. The efforts of the school should be to (1) detect the signs and symptoms of acute rheumatic fever in any child in the school population; (2) teach children with rheumatic heart disease to lead reasonable and well-regulated lives; and (3) encourage rational school attendance rather than perfect attendance by advising parents to keep children with respiratory infections at home so as to avoid exposing other pupils to infection.

*Nutrition*—Since rheumatic patients are usually in a poor state of nutrition and may have poor eating habits, care must be taken to encourage them to eat a well-balanced diet. It may be advisable to supplement the diet with cod-liver oil or with other vitamin preparations. As the infection subsides and the appetite improves, it is not unusual for some patients with restricted activity to become obese; therefore, the caloric intake of the diet may need closer attention during this phase.

*Climate*—Conclusive evidence is not available that a warm, dry climate favorably affects active rheumatic fever. Present knowledge indicates that protection from chilling, dampness, and exposure to streptococcal throat infections, a well-regulated life, and nourishing food are more important in combating the disease than climate.

*Prophylaxis*—Rheumatic subjects should be specially protected from contact with patients having streptococcal infections of the respiratory tract. Such patients should be rigidly isolated or the rheumatic subject should be removed from contact. Administration of small doses of one of the sulfonamides during the period of such active exposure is probably of marked prophylactic value.

Prolonged administration of sulfonamides in small doses for months or years to rheumatic subjects has proved effective in some studies.\* These drugs work favorably by preventing the streptococcal infection. They have little if any value in preventing a rheumatic attack if given only after the onset of the streptococcal infection. The seriousness of giving these drugs over long periods

\*See Kuttner reference under "Suggestions for Further Reading."



must be fully appreciated. On the one hand are: (1) the necessity of maintaining close watch for early detection of toxic manifestations, which may be fatal; (2) the possibility of producing hypersensitization to sulfonamides, precluding later use in an acute streptococcal infection. On the other hand, repeated attacks of rheumatic fever constitute the chief danger with respect to progressive heart disease. Could the rheumatic subject be limited to a single attack, the outlook would be much more favorable.

Salicylates mask the symptoms of this disease so much that their prophylactic effect cannot be accurately judged.

**Summary—When Rheumatic Fever Is Inactive**

*Take measures to improve the general health and resistance of the patient. Observe the patient regularly for signs of recurrence and alterations in cardiac status.*

*Encourage physical activity, to the limit of the individual's capacity. Only a small percentage of children at adolescence are found to have sufficient permanent heart disease to preclude normal activity.*

*Provide vocational guidance and occupational training for the relatively small group who cannot engage in normal physical activity.*

*Discourage parents and teachers from making a chronic invalid of the child. Educational authorities need to know that the vast majority who attend regular schools when the disease is inactive, can and should engage in normal school life.*

*Minimize exposure to upper respiratory infections, if possible, by improving unfavorable living conditions—for example, overcrowding in the home, particularly in bedrooms—and by controlling the spread of infection through school and family contacts.*

**Laboratory Aids in Recognition and Management of Rheumatic Fever**

*Erythrocyte Sedimentation Rate*—This is a nonspecific test for evidence of infection. The fall of the red blood cells is more rapid when the patient has an active infection. The readings are expressed in mm. of fall of cells in a given period of time—for example, 15 mm. at the end of one hour. There are different methods of performing this test, and standards consequently differ. (See Appendix C.)

*Hemoglobin and Erythrocyte Count*—With rheumatic fever, as with other low-grade infections, there is usually an associated secondary anemia. Iron therapy is unavailing during the active stage of the disease.

*Leukocyte Count*—There is usually an elevation of the white blood count with active rheumatic fever, as with other types of infection, but such elevation is obviously not a specific diagnostic sign.



*Electrocardiogram*—This may be helpful in judging activity and observing the effect of digitalis. The significant changes in rheumatic fever are: (1) prolongation of P-R and Q-T intervals; (2) flattened or inverted T<sub>1</sub> and T<sub>2</sub> waves; (3) broadening of P and QRS complex. Prolongation of the P-R interval and changes in T<sub>1</sub> and T<sub>2</sub> waves also occur as a result of digitalis. A change in successive records may be more significant than any abnormality in one record.

*Vital Capacity*—Some observers have found that measurement of vital capacity is a useful criterion when a child may become ambulatory, since a diminished vital capacity is the earliest sign of cardiac failure. It is generally recognized that a diminished cardiac reserve is due to an active carditis. If the test is employed, it is desirable to have quite frequent readings for each patient to determine whether any change is occurring. Standards have been established and are helpful where there is definite deviation from normal. The normal range is quite wide; consequently it is necessary to establish a base line for each patient. A thorough discussion of the technique of vital capacity measurement and the standards for normal children, as well as the results of tests of children with heart disease, is given by Wilson.\*

#### Public Health Considerations

What can be done to prevent rheumatic fever and rheumatic heart disease? Until the cause of rheumatic fever is isolated, prevention must follow along general lines rather than on one or more specific ones. The concept that a hereditary susceptibility underlies the familial tendency to rheumatic fever indicates that other members of the rheumatic patient's family should be studied for evidence of the disease. The association of rheumatic fever with streptococcal infections, chilling, and crowded unhygienic living conditions suggests that efforts at prevention should be made with these factors in mind. Better care of patients with active rheumatic infection tends to minimize the effect of cardiac involvement. This means not only emphasis on bed rest and good nursing care in the active and subacute stages of the disease but, for the underprivileged, the correction, as far as possible, through the services of social and welfare agencies in the community of those socioeconomic factors which may influence the incidence and control of the disease. During remissions, attention should be given to regular medical and nursing supervision, good living habits, and occupational training in keeping with the patient's cardiac handicap. Every effort should be made, if the diagnosis of rheumatic heart disease is in doubt, to secure consultation with those who are familiar with cardiac conditions in children.

\*Wilson, May G., M.D. *Rheumatic Fever*. The Commonwealth Fund, New York. 1940.



**Community Organization**

Today we know that the nature of rheumatic fever produces certain problems which cannot be solved by individuals operating alone. Proper organization applied to the solution of these problems would probably minimize the effects of the disease and conserve the lives of rheumatic individuals. The difficulty frequently associated with the diagnosis of the disease suggests that diagnostic services be made available to the practicing physician to assist him in diagnosis and to encourage reporting of the disease. The tendency of the disease to recur demands that plans be developed to educate teachers, parents, social workers, and others in daily association with the child to recognize the manifestations of rheumatic activity and the importance of periodic medical examination. The prolonged and expensive care usually necessary during the active and convalescent stages of rheumatic fever implies that in many instances this must become a community responsibility. The crippling effect upon the heart suggests that occupational guidance may be vitally important in certain cases. To meet these complicated needs, which are not unlike those in the management of a case of tuberculosis today, organized medico-social effort is necessary.



In England, the London County Council School Medical Authority has a plan which operates in conjunction with the Ministry of Health and Board of Education to discover cases, insure proper diagnosis, provide care during the active stage, and give supervision after recovery. The services of the family physician, the clinic, the hospital, the convalescent home, the school, and the home are so integrated that the child with rheumatic fever receives adequate care during the acute attack, and regular medical supervision afterward. Funds for the care of children with rheumatic fever are provided to a limited degree through Title V, Part 2, of the Social Security Act, administered by the Children's Bureau, United States Department of Labor. The following States had rheumatic fever programs by January 1944: California, Connecticut, District of Columbia, Idaho, Iowa, Maine, Maryland, Michigan, Minnesota, Nebraska, Oklahoma, Rhode Island, South Carolina, Utah, Virginia, Washington, and Wisconsin. These rheumatic fever programs are now confined to a few counties within the States. Children who live in these areas may be referred to the State agency for diagnosis and care including hospital, convalescent, and foster-home care. Medical, nursing, and social services are provided.



The service of the public health nurse is utilized in State or county rheumatic fever programs to provide nursing care for children who need not be hospitalized and to supervise those who have recovered. (A form showing the type of information from the physician needed by the nurse is given in the Appendix, page 29.)

The school, through its medical and nursing service, is an important link in the chain of continuous supervision. Since the disease usually begins in children of school age, teachers, school nurses, and physicians are vitally concerned with the discovery of children with rheumatic heart disease. This can be accomplished by periodic medical examinations and also by making teachers and school nurses familiar with the manifestations of acute rheumatic fever so that they can suspect it as a possibility in children who exhibit characteristic signs and symptoms.

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Several chapters are devoted to the problem of recognition and supervision of the school child with rheumatic fever or rheumatic heart disease.
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- SWIFT, HOMER F., M.D. "Public Health Aspects of Rheumatic Heart Disease. Incidence and Measures for Control," *Journal of the American Medical Association*, Vol. 115. November 2, 1940.
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- WALSH, BERNARD J., M.D. "The Need for Occupational Therapy for Children with Heart Disease," *Occupational Therapy and Rehabilitation*. April 1942. Pages 94-97.
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## APPENDIX A

### Suggested Procedure for the Examination of the Heart\*

In the clinical examination of the child's heart there are only a few facts of importance that must be elicited. They are: (1) the size of the heart; (2) the presence of abnormal cardiac sounds; (3) the presence of a murmur; (4) the cardiac rhythm.

#### *The Size of the Heart*

The position of the apex impulse can often be determined by inspection, and inspection should be checked by palpation. The left margin of the maximal apex impulse (the lower and outermost point) is the most accurate point for determination of the heart size. It should lie within 1 cm. of the midclavicular line, a better landmark than either the nipple line or an arbitrary measurement from the midsternum. In children below the age of 7 it is frequently in the fourth intercostal space. In older children it is in the fifth intercostal space, although it is sometimes found in the sixth intercostal space in normal children or young adults of the asthenic habitus with vertically placed hearts.

#### *Cardiac Sounds*

For complete stethoscopic examination of the heart, the patient should be examined in the upright, recumbent, and lateral positions. Alterations in the sounds of the heart are often as important as cardiac murmurs. In the timing of all heart sounds and murmurs, the examiner should listen first at the base of the heart and identify the sharp second sound. He can then gradually approach the apex and retain the position of this sound in relation to other sounds and murmurs. Any undue accentuation of either the first heart sound or the second should be noted. In most children and in many young adults, particularly those with thin chests, the normal third sound may be heard shortly after the second in the region of the apex.

#### *Cardiac Murmurs*

As in the appraisal of heart sounds, the examination is best started at the base of the heart so as to secure accurate timing. The absence of a murmur should be decided only after listening to all the valve regions. It is best to use both a Bell type and a Bowles type of stethoscope, as the high-pitched blowing murmurs are heard best with the latter, and the low-pitched murmurs best with the former.

#### *Systolic Murmurs*

The most common murmur is the systolic murmur over the pulmonic valve area. This murmur may be transmitted to other parts of the precordium. It usually changes considerably with change in position and will be decreased and often completely disappear in full inspiration. Such a murmur as a solitary finding in the heart is almost always of no importance.

Another extremely common systolic murmur heard over the precordium is the cardiorespiratory murmur. This murmur also varies considerably with change in position and with respiratory phases. At some point in the respiratory cycle the murmur will often disappear completely. This point is not necessarily at either full inspiration or full expiration, but often at an intermediate position.

\*Based on the booklet, "Examination of the Heart," prepared by the Committee on Leaflets and Pamphlets of the American Heart Association, 1790 Broadway, New York, N. Y. See also "Classification of Murmurs" from the same publication reproduced here on the last page.



Systolic murmurs at the apex are common as a normal phenomenon in young persons. But in the presence of a systolic murmur it must be shown that (1) there is no history of rheumatic fever; (2) it is not associated with cardiac enlargement, either by physical examination or fluoroscopy.

Acute infections or other causes of ill health, notably anemia and malnutrition, may temporarily produce apical systolic murmurs. Systolic murmurs are not uncommon in overactive normal hearts.

Systolic murmurs of importance at the apex generally merge with the first heart sound and are rougher and louder than the murmurs mentioned above. Any systolic murmur accompanied by a thrill is also important and usually signifies some valvular deformity.

Where any doubt exists as to the significance of the systolic murmur, the child should be given the benefit of a more complete study by a qualified consultant.

#### *Diastolic Murmurs and Continuous Murmurs*

Both of these invariably indicate the presence of structural changes in the heart on an acquired or a congenital basis. Children with such murmurs should also be given the benefit of an examination by a qualified consultant.

#### *Cardiac Rhythms*

*Tachycardia*—Simple acceleration is often found during the examination of nervous children. The rate may be as fast as 160. It often slows temporarily on forced expiration, after a deep breath.

*Bradycardia*—A slow heart rate is uncommon in young children, but is occasionally found in normal athletic young adults. It should not be considered as evidence of heart disease by itself. Increase of the rate on exercise will usually prove that heart block is not present.

*Sinus arrhythmia*—This irregularity is the customary finding in children. It consists of changes in the rate associated with inspiration and expiration.

*Premature systoles*—Probably have no more significance in children than they have in adults. It is perhaps advisable to secure an electrocardiogram.

Other abnormal rhythms of the heart are usually characterized by a continuously rapid rate, by paroxysms of tachycardia, or by a continuous and complete irregularity. They should be investigated by electrocardiography.

It should be apparent that for a complete evaluation of the condition of the heart an accurate history of any discomfort induced by physical activity must be secured.

Furthermore, the examination of the heart is never complete without a general physical examination. Much valuable information concerning the functional state of the heart is obtained by attention to other organs.



## APPENDIX B

### Classification of Heart Disease

Diagnosis and management of all types of heart disease will be improved when there is a common use by physicians of the standard terminology. *The Nomenclature and Criteria for Diagnosis of Diseases of the Heart\** gives this information. It is of considerable importance to those who must supervise cardiac children to know their functional capacity. Following is a classification recommended:

#### Functional Capacity

At the present time there is no clinical test which will measure accurately the functional capacity of the heart. For the purposes of this classification it is to be estimated by appraising the patient's ability to perform physical activity. The estimate is only approximate, for it is derived, largely by inference, from the history. It represents an expression of opinion concerning the functional capacity of the patient as modified specifically by his cardiac disease.

In the estimation of cardiac functional capacity, the term *ordinary physical activity* is used to describe the actual performance of which each patient was capable prior to the onset of manifest cardiac disease. In estimating a patient's response to effort, a comparison must be made between his ordinary and his present capacity for physical exertion. Usually this estimate is based entirely on the history, particularly with reference to the patient's symptoms on effort. An accurate account of the reaction produced by varying degrees of exertion—such as walking on the level or up a grade, ascending stairs, or running—is an essential part of the history. In general, the more intense the subjective symptoms, the more marked are the physical signs of cardiac insufficiency.

- Class I (formerly I†)—Patients with a cardiac disorder without limitation of physical activity. Ordinary physical activity causes no discomfort.
- Class II (formerly IIa†)—Patients with a cardiac disorder with slight to moderate limitation of physical activity. Ordinary physical activity causes discomfort.
- Class III (formerly IIb†)—Patients with a cardiac disorder with moderate to great limitation of physical activity. Less than ordinary physical activity causes discomfort.
- Class IV (formerly III†)—Patients with a cardiac disorder unable to carry on any physical activity without discomfort.

#### Therapeutic Classification

The "Therapeutic Classification" is intended to serve as a guide in the management of patients. For each class it gives a prescription for the amount of physical activity which is advised.

The functional capacity of the patient does not always determine the amount of physical activity which is permitted. For example, a child with active rheumatic carditis may not experience discomfort on playing baseball, yet the physician

\*By the Criteria Committee of the New York Heart Association. Published by the New York Heart Association. 1939.

†The former classes I, IIa, IIb, and III included only patients with organic heart disease.



knows that rest in bed is imperative. There is frequently a difference between the amount of physical activity which the patient *can* undertake, in terms of his functional capacity, and that which he *should* attempt, in order to prevent further cardiac damage and bring about improvement. The recommendation as to physical activity is based upon both the amount of effort possible without discomfort, and the nature and severity of the cardiac disorder.

Class A—Patients with cardiac disease whose physical activity need not be restricted.

Class B—Patients with cardiac disease whose ordinary physical activity need not be restricted, but who should be advised against unusually severe or competitive efforts.

Class C—Patients with cardiac disease whose ordinary physical activity should be moderately restricted, and whose more strenuous habitual efforts should be discontinued.

Class D—Patients with cardiac disease whose ordinary physical activity should be markedly restricted.

Class E—Patients with cardiac disease who should be at complete rest, confined to bed or chair.

#### Potential Heart Disease\*

Patients in whom no cardiac disease is discovered, but whose course should be followed by periodic examinations because of the presence or history of an etiological factor which might cause heart disease. The diagnosis in these cases is "Potential Heart Disease." The etiological diagnosis should also be recorded.

#### Possible Heart Disease

Patients with symptoms or signs referable to the heart but in whom a diagnosis of cardiac disease is uncertain should be classified tentatively as "Possible Heart Disease." When there is a reasonable probability that signs or symptoms are not of cardiac origin, a diagnosis of "Possible Heart Disease" should not be made. Reexamination after a suitable interval will usually establish a definite diagnosis.

\*There are patients in whom the symptoms or signs, though suggestive of cardiac disease, do not justify a definite diagnosis, and from whom is obtained a history of an etiological factor which might cause heart disease. The diagnosis in such cases is both "Potential Heart Disease" and "Possible Heart Disease."



APPENDIX C  
Sedimentation Methods and Table Showing Normal Values  
as Given by Various Authors

Author	Method	Normal Values
Rourke	Rate of fall in millimeters per minute during the period of most rapid fall.	0.08 to 0.35 mm. per minute.*
Ernstene	Correction for hematocrit.	
Westergren	Measurement of the distance which the sedimenting corpuscles fall in a specified interval of time.	Upper limit of normal 5-15 mm. in 45 minutes (mean 10 mm.).
Wintrobe	Recorded fall in millimeters in one hour. Hematocrit correction by author's chart.	Upper limit of normal 10 mm. in one hour.
Landau†	Readings made in millimeters of fall after one hour. Original length of blood column 62.5 mm.	Children under 2 years 1 to 6 mm. in one hour. Children over 2 years 1 to 9 mm. in one hour.
Cutler	Graphic recording of the sedimentation of the corpuscles. Plotting fall in millimeters against time.	Upper limit of complete fall Men—8 mm. in one hour. Women—10 mm. in one hour.
C. H. Smith	Capillary blood. Number of millimeters which corpuscles have fallen at the end of one hour.	Normal infants and children 1 hour: mean 9 mm.; range 3 to 13 mm. ½ hour: mean 4 mm.; range 1 to 8 mm.

\*Normal values based on corrected sedimentation rate.  
†Modification of Linzenmeier-Raunert method.



APPENDIX D

Type of Information from the Physician  
Which the Visiting Nurse Will Find Useful

Physician's Referral Slip\*

Name..... Date.....

Address.....

I. Diagnosis and present condition.....

II. Physician's instructions regarding care:  
A. Privileges and activities (See the attached sheet )

B. Medications.....

C. Diet.....

D. Shall the mother take T.P.R.?..... How often?.....

E. Frequency of nursing visits desired.....

F. Is a report of each nursing visit desired?..... Or how frequently?.....

G. Shall a report of the social situation be included?.....

H. Shall hospitalization be urged?.....

I. Date the patient is to return to the clinic.....

III. Remarks or special requests.....

Signed..... (Physician)

\*From Virginia State Department of Health, Crippled Children's Bureau—Rheumatic Fever Clinic.



APPENDIX E

Information from the Physician Regarding Privileges Allowed a Rheumatic Fever Patient Which the Parent, Nurse, and Home Teacher or Occupational Therapist Will Find Helpful\*

Name..... Date.....

Privileges allowed as checked below:

- 1. Complete bed rest.
- 2. Complete bed rest, allowing the patient to feed himself.
- 3. Complete bed rest, allowing the patient to feed himself, plus bathroom privileges for bowel movements only.
- 4. Complete bed rest, allowing the patient to feed himself, bathroom privileges for bowel movements only, and allowing the patient ..... hours out of bed in the morning and ..... hours out of bed in the afternoon.
- 5. Same as privileges allowed in No. 4, plus the morning toilet, allowing the child to dress himself.
- 6. Complete bathroom privileges.
- 7. .... minutes' daily walk on level ground.
- 8. Up and about except for ..... hours' rest after meals and .....
- 9. Other activities allowed as checked below:

- |   |  |
|---|--|
| <input type="checkbox"/> Listening to quiet stories.  | <input type="checkbox"/> Weaving small objects.            |
| <input type="checkbox"/> Listening to quiet stories, radio programs, such as music, Victrola records.   | <input type="checkbox"/> Pasting scrapbooks.               |
| <input type="checkbox"/> Watching mechanical toys.  | <input type="checkbox"/> Painting.                         |
| <input type="checkbox"/> Watching flowers and plants grow, learning to name plants and flowers and color of blossoms.                           | <input type="checkbox"/> Clay modeling.                    |
| <input type="checkbox"/> Watching goldfish in an aquarium, or canary birds in a cage, or perhaps a small turtle or an alligator in an aquarium. | <input type="checkbox"/> Drawing.                          |
| <input type="checkbox"/> Puzzles, simple.   | <input type="checkbox"/> Carving soap.                     |
| <input type="checkbox"/> Checkers and related games.  | <input type="checkbox"/> Construction.                     |
| <input type="checkbox"/> Blocks.  | <input type="checkbox"/> Reading more stimulating stories. |
| <input type="checkbox"/> Cutting.   | <input type="checkbox"/> Study-home teacher.               |
| <input type="checkbox"/> Sewing.  | <input type="checkbox"/> Visitors.                         |
|   | <input type="checkbox"/> Blow toys, e.g., balloon.         |
|   | <input type="checkbox"/> Radio—more stimulating programs.  |
|   | <input type="checkbox"/> Loom weaving.                     |
|   | <input type="checkbox"/> Wood carving.                     |
|   | <input type="checkbox"/> Croquet.                          |
|   | <input type="checkbox"/> Jack stones.                      |
|   | <input type="checkbox"/> Care of plants and flowers.       |

NOTE

- (a) All complete bed patients are allowed back rests, except after meals.
- (b) All complete bed patients can be lifted to a couch or easy chair, unless otherwise specified.
- (c) All patients should have meals in bed unless otherwise specified, and should rest 1½ hours after meals.

\*From Virginia State Department of Health, Crippled Children's Bureau—Rheumatic Fever Clinic.



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**APPENDIX F**  
**CLASSIFICATION OF MURMURS**

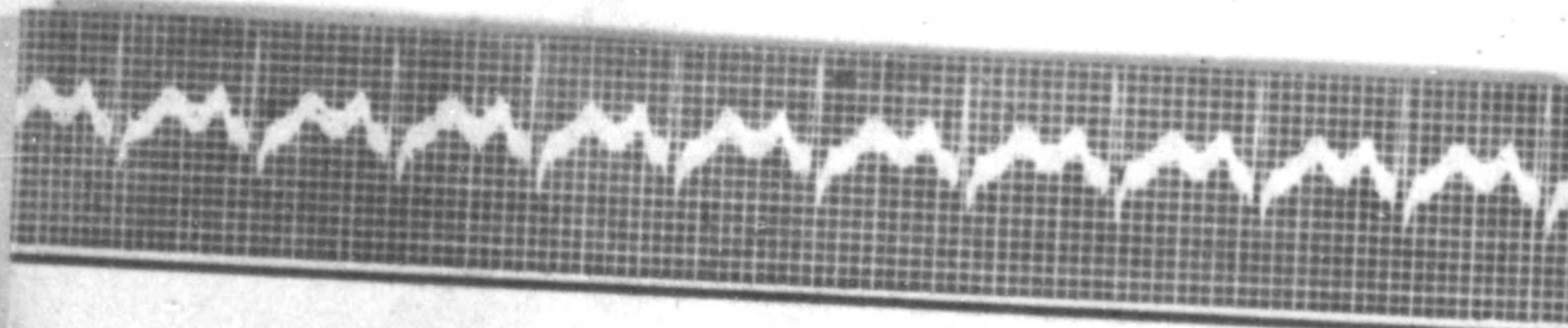
POINT OF MAXIMAL INTENSITY	POSITION IN CYCLE	PREFERRED METHOD OF AUSCULTATION	CHARACTER	TRANSMISSION	ASSOCIATED WITH THRILL	CHANGE OF HEART SOUNDS	RELATION TO RESPIRATION	RELATION TO POSITION	DIAGNOSIS
<b>Important Systolic Murmurs</b>									
Apical	Throughout systole	Bell and diaphragm	Harsh	Toward axilla	Very rare	First sound often diminished or masked	Usually somewhat less intense with full inspiration	Little or no change	Mitral regurgitation
Aortic	"	"	Often loud	Toward neck	Often present	Aortic second diminished or absent*	"	"	Aortic stenosis
Pulmonic (rare)	"	"	"	Heard widely over left upper chest	Often present	Pulmonic second may be accentuated or diminished	Usually less intense with full inspiration	"	If associated with cyanosis and clubbing— Pulmonic stenosis
To the left of midsternum	"	"	Loud very harsh	"	Always present	0	0	0	Interventricular septal defect
<b>Unimportant Systolic Murmurs</b>									
Lower precordial or apical	Early or midsystole	"	Blowing or harsh	Localized	0	0	Variable, may disappear during inspiration or expiration	Variable and may disappear	Cardiorespiratory or unexplained
Pulmonic (common)	Throughout systole	"	Blowing or moderately harsh	May be heard over upper precordium	0	0	Less intense or disappears with inspiration	"	Physiological
<b>Diastolic Murmurs—Always Important</b>									
Apical	Mid and late diastole	Bell	Low pitched and rumbling	Localized	Often present	First sound loud†	Little change	Louder recumbent	Mitral stenosis
Left sternal border	Early or whole diastole	Diaphragm or naked ear	Blowing	Right and left sternal borders and lower end of sternum	Very rare	Aortic second often diminished	Loudest at full expiration	Loudest erect with patient leaning forward	Aortic regurgitation
<b>Continuous Murmurs</b>									
Second or third left interspaces near sternum	Through systole and diastole	Bell and diaphragm	Harsh louder in systole	Over left upper chest	Systolic or continuous	0	Little change	Little or no change	Patent ductus arteriosus

\*Aortic insufficiency usually present as well.  
†Unless replaced by systolic murmur.

From *Examination of the Heart*, The American Heart Association, New York, N. Y.

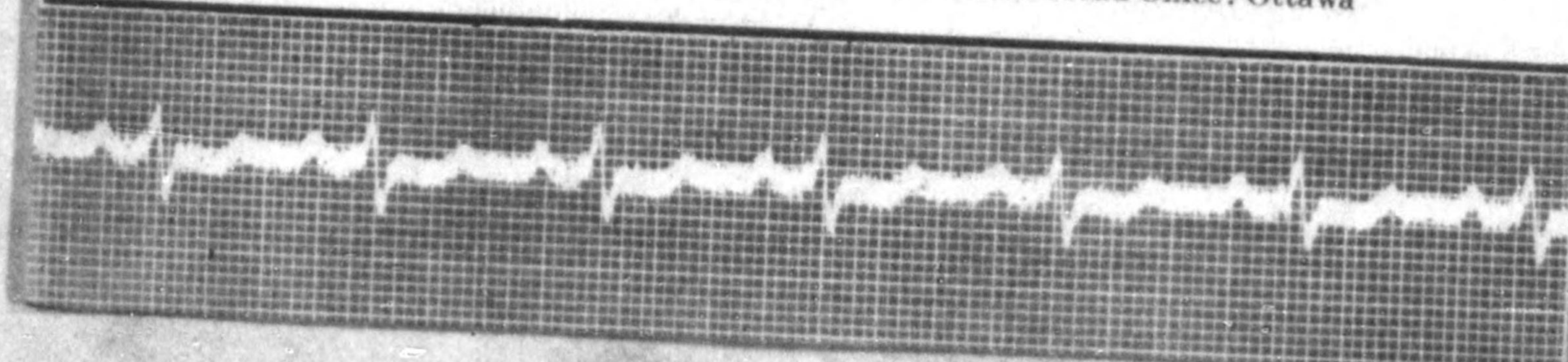
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**PROTECTING  
YOUR  
HEART**

**METROPOLITAN LIFE INSURANCE COMPANY**  
HOME OFFICE: NEW YORK  
Pacific Coast Head Office: San Francisco Canadian Head Office: Ottawa





*Prepared with the  
Cooperation and Advice of the  
American Heart Association, Inc.*





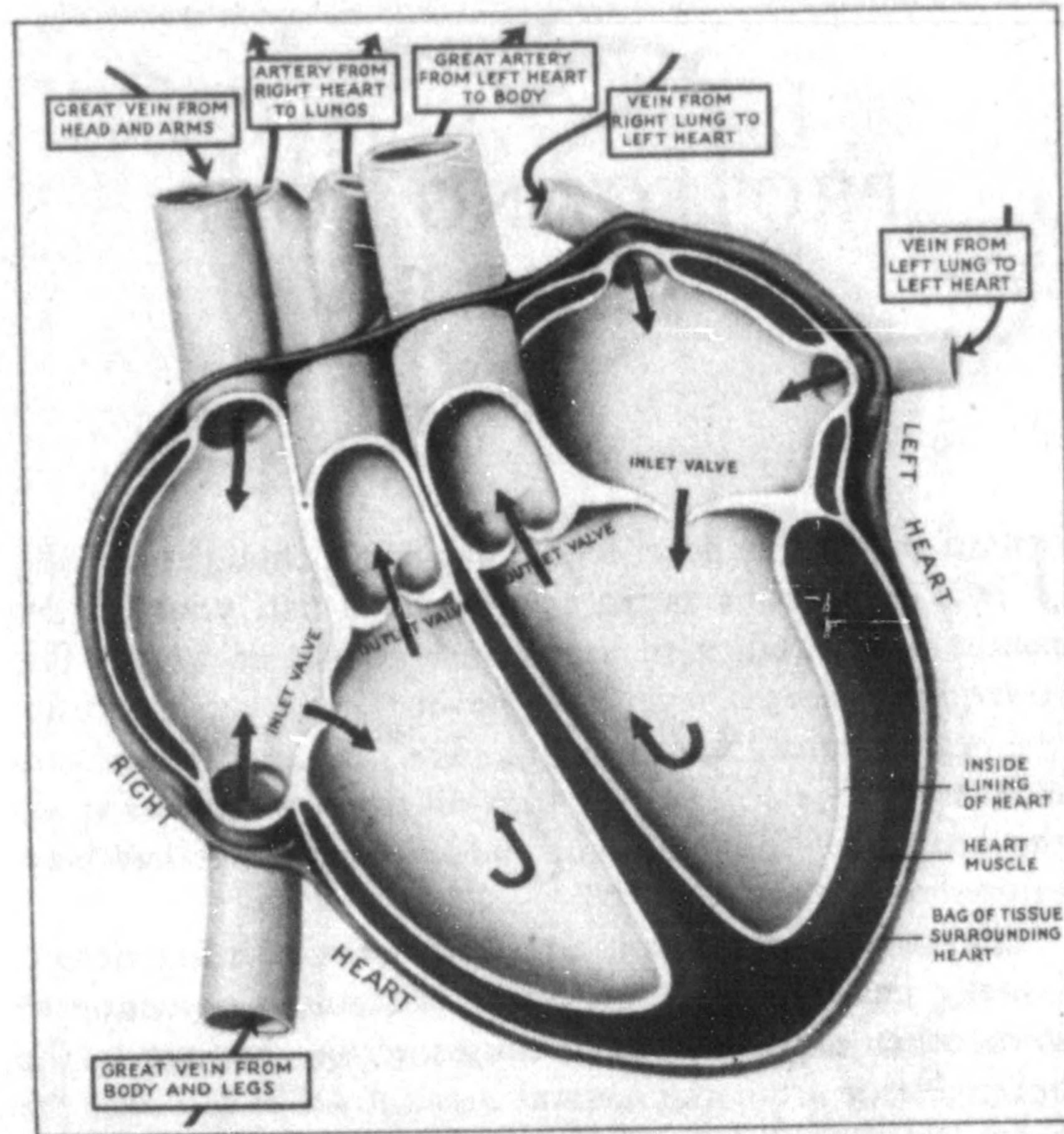
PROTECTING YOUR  
HEART

**J**UST consider the heart for a moment. Although normally it is only about as big as a clenched fist, your life depends on its ability to keep continuously at work. The heart never sleeps, never loafs, never takes a vacation from the beginning of life to the end. The only rest it ever gets is between beats. And yet with all the work it has to do the heart does not give out suddenly unless it has been injured or ill-treated.

Relatively few people are born with a heart defect. Usually heart disease develops as a result of infection or some other condition which causes actual damage to the heart. Aside from the natural breakdown of old age, the heart may usually be protected from injury. Even after heart disease has developed, it may often be arrested by intelligent care.

The operation of the heart is controlled automatically by the involuntary nervous system—the division of the nervous system which governs the action of all structures and organs not under the control of the will. But although we do not consciously direct the operation of the heart, we are in many ways responsible for its good conduct. To know how to protect the heart it is necessary to know something about it and how it is affected by the things we *can* control.





**T**HE heart is a powerful hollow muscle divided, by a wall down the middle, into two main divisions—a right and a left. Each division has two chambers which work together as a unit. The blood stream flows from the body into the right side of the heart through veins. From there it is pumped to the lungs where it gets rid of a waste gas (carbon dioxide) collected from the body cells and picks up a load of oxygen to carry to the body cells. After passing through the lungs the blood stream flows into the left side of the heart from which it is pumped to the body through arteries.

The drawing on this page is not an exact representation of the heart in cross section, but rather a pictorial diagram to show the course taken by the blood from the body → to the heart → to the lungs → back to the heart → and out to the body again.



### **The Healthy Heart and How It Works**

**N**OT a single living cell in the body can exist for more than a few minutes without oxygen. Every cell must have food and water. Every cell produces wastes which must be removed.

Most of the cells of the body are fixed in one place. They cannot move about to obtain supplies of oxygen, food, and water and to get rid of wastes. Everything they need must be carried to them; everything they must get rid of must be carried away from them. The blood is the great common carrier of the body, and the heart is the pump which keeps the blood moving in a steady stream through an intricate system of blood vessels to keep the body alive.

Blood is forced through the blood vessels by the contractions or "beats" of the heart. After each contraction the heart has a split second of rest before it beats again. During the rest period after each beat, blood flows into the heart through inlet valves. As the heart tightens on its contents at the next contraction, the inlet valves close, preventing a back flow, and the outlet valves open. Through these open valves the blood is driven out of the heart into the arteries which distribute it to all parts of the body.

The arteries have relatively thick elastic walls which stretch to accommodate each fresh load of blood driven out by the heartbeat. In the rest period between beats the stretched elastic walls recoil and thus help to press the blood continuously onward. By the term "blood pressure" is meant the pressure exerted by the blood on the walls of the arteries.



### The Rate of the Heartbeat

The heart is constantly pumping blood at a rate which increases or decreases with the varying activity of the body. From experience you know that muscular exercise increases the rate of the heartbeat. This insures the pumping per minute of an amount of blood which may be four times as great as when the body is at rest. By increasing the amount of blood pumped by the heart, increased supplies of oxygen and food are rushed to the working body cells and waste removal is speeded up.

As a rule, the healthy heart can accommodate itself without difficulty to the varying requirements of the body in action. But unusual or unduly violent or prolonged exertion may damage the heart. A safe rule to follow is to stop exercising when you begin to feel too tired. Before engaging in any form of severe exercise to which you are not accustomed, have a physician examine your heart.

During illness, especially an illness with fever, the rate of the heartbeat may be greatly increased and the heart temporarily weakened. The physician may keep a person in bed for some time after a severe illness in order to give the heart plenty of time to recover its strength.

The heart is able to keep continuously at work driving forth a heavy load of blood at each beat because it rests between beats. The slower the heart beats, the longer the rest periods will be. When the heart must beat for a long time at a rapid rate, it may not have enough time to rest and to restore itself.

The heart beats more slowly during sleep than at any other time. One of the most important things you can do to keep your heart in good condition is to get a good night's rest each night. A heart that is given a chance to get enough rest is less likely to break down prematurely than is a heart that is overworked.



### Causes of Heart Disease

**H** EART disease is a general term which covers a number of different diseases of the heart. By this general term is meant any defect in the heart which interferes with its proper functioning. The most common types of heart disease are caused by:

1. The invasion of the heart by germs or toxins which damage the heart muscle, the valves, the tissue lining the cavity of the heart, or the bag of tissue which surrounds the heart.
2. Overwork of the heart muscle caused by any great or unusual strain, such as that imposed by high blood pressure or disease of the valves.
3. Degenerative disease of the coronary arteries which supply the heart muscle with blood.

### Rheumatic Heart Disease

The greatest danger of rheumatic fever lies in the serious damage it may do to the heart. The disease usually begins in childhood between the ages of 5 and 15, but its serious consequences may not show up until adult life because in childhood the symptoms of the disease are often vague or slight, and the young heart has a large reserve which it can draw on before symptoms of heart disease appear. Thus, many cases of heart disease and heart failure in adults, especially those under 40, can be traced to rheumatic fever which started in childhood.

An attack of rheumatic fever, especially in persons who have had previous attacks, may follow a sore throat, tonsillitis, or a cold. The first or earliest symptoms may be slight fever, nosebleeds, loss of appetite, failure to gain weight, rapid heart action, and pain (often vague and fleeting) in joints and muscles. These symptoms, while characteristic of the onset of the disease in children, may be so indefinite that physicians find it difficult to diagnose rheumatic fever in its earliest stages. More



definite signs which may or may not appear include the formation of nodules under the skin, a typical rash, and very painful and inflamed joints and high fever. Sydenham's Chorea, or "St. Vitus's Dance," is now recognized as a manifestation of the rheumatic infection. A child with even the slightest symptoms needs a careful examination by a physician. Today physicians employ diagnostic aids such as the sedimentation test, the electrocardiograph, and the fluoroscope to assist in early diagnosis of rheumatic fever and of heart damage.

Unlike diphtheria or other diseases against which the body, following an attack, builds up an immunity, rheumatic fever can attack a person again and again. If repeated attacks occur, the delicate valves of the heart may be permanently damaged. The best protection for one who has had an attack of rheumatic fever, while not a guarantee against a recurrence, is periodic medical supervision with emphasis on rest, good nutrition, good hygiene, and protection from respiratory infections. By following the advice of the physician, many individuals with damaged hearts may lead active normal lives. Although the exact cause of the disease is still undiscovered, recent studies show that by prompt medical care during attacks of the disease and medical supervision at regular intervals thereafter, it is possible for the majority of those who have had the disease to reach maturity and follow productive careers. Promising experiments have been made in the use of sulfa drugs to prevent recurrences.

#### **Syphilitic Heart Disease**

Syphilis is the next most common infection responsible for heart disease. The germs of syphilis attack particularly the large blood vessel, called the aorta, into which blood is pumped directly from the left side of the



heart. Disease of the heart and aorta due to syphilis is not, as a rule, detected until many years after the germs of syphilis have first entered the body. Thorough medical treatment of syphilis in the early, or chancre stage, is of great importance in preventing the development of disease of the heart and aorta later in life.

**The Heart in Diphtheria, Scarlet Fever,  
and Other General Infections**

Heart weakness or heart failure during or following an infectious disease, such as diphtheria, scarlet fever, pneumonia, and influenza, is caused as a rule by the poisonous effect on the heart and blood vessels of toxins produced by the germs and by the great strain placed on the heart in helping the body to overcome the infection. Occasionally the germs themselves may be carried by the blood to the heart and find lodging there, with consequent damage to the heart tissues.

The toxin of diphtheria, especially, may attack the heart muscle and cause serious trouble. Recovery, however, almost always means escape from any permanent or serious damage to the heart. Fortunately the use of anti-toxin in the early stages of diphtheria helps to keep the heart from becoming involved. More fortunately still, no child need have diphtheria if his parents have him protected from it by treatment with toxoid or toxin-anti-toxin. Scarlet fever, which is a streptococcus infection, may have an effect on the heart similar to that of rheumatic heart disease. Pneumonia and severe influenza are peculiarly exhausting diseases which place great strain upon the heart. As a result a long rest in bed and a slow return to active life are usually ordered by the physician for the patient who is recovering from an infectious disease which has overtaxed or poisoned the heart.



### Focal Infections

In a focal infection the germs are localized in some one part of the body. Common examples are diseased tonsils, tooth abscesses, and infected sinuses.

Although such infections are usually confined to one spot, the blood, as the great common carrier of the body, may transport germs or their poisons from the seat of infection to other parts of the body. It is not known how frequently actual damage to the heart is caused by focal infections. We do know, however, that heart disease already existing is sometimes made worse by their presence. Physicians view focal infections as probable causes of ill health and usually advise their eradication when this is possible.

### High Blood Pressure

"What causes high blood pressure?" has been called one of the most important unanswered questions of medical science. The most acceptable and widely held explanation is that for reasons unknown the smallest arteries (arterioles) contract, or become narrowed, and thus increase the tension or resistance offered by their walls to the passage of blood through them.

More or less constant strain is placed on the heart when it must pump blood into the arteries against an increased pressure. For this reason high blood pressure may produce changes in the heart muscle which impair its working ability.

Heart disease caused by high blood pressure, like high blood pressure itself, is commonest in middle age and after. Factors or conditions associated with high blood pressure are:

- Heredity; that is, a tendency to high blood pressure seems to run in families.
- Overweight.



Leading a high-tension life; worry, fear, long-continued excitement, and nervous strain.

A certain type of kidney disease.

Disturbances of the ductless glands.

Arteriosclerosis.

The treatment of high blood pressure—which may or may not include a special diet—depends on the conditions which the physician finds associated with it.

#### Arteriosclerosis

Arteriosclerosis is the term applied to degenerative changes in the arteries. As a result of such changes the walls of the arteries become hard, rigid, and rough on the inside. Arteriosclerosis is common in old age, when it is usually the result of the natural process of aging. It is also associated with abnormal conditions, such as high blood pressure, gout, diabetes, Bright's disease, and infections which damage the arterial walls. Arteriosclerosis frequently causes disturbances in the organs or other structures supplied by the diseased arteries.

The arteries which supply the heart muscle itself with blood are the coronary arteries. When these become stiff and narrow they can no longer carry to the heart muscle the blood necessary to nourish it properly. The severe chest pain known as angina pectoris is frequently due to an insufficient blood supply to the heart muscle, the result of disease of the coronary arteries. Actual starvation of the heart muscle may occur if the narrowing of the coronary arteries goes far enough.

Arteriosclerosis may also lead to thrombus, or blood clot, formation in an artery. The blocking of a coronary artery by a thrombus causes serious interference with the blood supply of the heart muscle. This is called coronary thrombosis.



### Symptoms of Heart Disease

**B**Y GIVING rise to certain symptoms the heart announces that it can no longer respond with ease to all the demands placed upon it. In the earlier stages of heart disease, however, a person may have no feelings of bodily discomfort, or he may ignore or misinterpret warnings which would be plain to a physician. The condition is frequently discovered in the course of a routine physical examination. This is one reason why periodic physical examinations are so important.

Symptoms frequently associated with heart disease are pain, or a feeling of oppression in the front of the chest; marked shortness of breath during or after ordinary exertion; and palpitation, or the sensation of feeling the heart beat rapidly or irregularly. However, the heart may be in a healthy condition even if one or more of these symptoms are present. Only a physician will be able to determine their importance.

**Angina pectoris** is the type of pain most often heard about in connection with heart disease. It almost always is associated with bodily effort. There is a tendency for the pain to radiate from the chest to the left shoulder and down the arm to the fingers. Angina pectoris, as we have seen, is frequently due to interference with the blood supply of the heart muscle. The symptoms may rarely be caused by a disturbance of function without organic disease.

**Shortness of breath during or after ordinary exertion**, when due to heart disease, is usually produced by congestion in the blood vessels in the lungs. This happens most commonly because of failure of the left side of the heart to pass blood on from the lungs as fast as it is delivered by the right side into the lungs. Attacks of heavy breathing due to acute failure of the left side of the heart sometimes occur at night. This form of difficult breathing is frequently termed cardiac asthma.

In addition to the symptoms mentioned, there are several others which may or may not be associated with



heart disease. Remember that many people who think they have symptoms of heart disease have perfectly normal hearts. Don't worry—but to be on the safe side, let your physician decide the importance of any persistent feelings of bodily discomfort. Remember, also, that heart disease, when detected in its early stages, may often be arrested.

#### **Some of the Ways in Which the Physician Determines the Condition of the Heart**

**P**ROBABLY you have had your blood pressure measured in the course of a regular physical examination. In measuring blood pressure the physician uses an instrument which records the amount of pressure exerted by the blood against the wall of the main artery of the arm. A certain degree of blood pressure is normal for each age. If the pressure is lower than the normal limits, a person is said to have low blood pressure. If it is higher, he is said to have high blood pressure.

If your physician tells you that you have high blood pressure you can be of great help to him in his treatment of your case by keeping calm and following his directions exactly. Some people get so excited on being told that they have high blood pressure that they develop nervous symptoms which make them think they have heart disease, although little or no actual damage to the heart may as yet exist.

By using a stethoscope the physician can listen to the sounds which accompany each stage of the heart's action and detect "murmurs" or other deviations from normal which may or may not indicate weakness in the heart muscle or damage to the valves. By using a fluoroscope he can actually see the heart and near-by blood vessels in silhouette and observe whether or not they are normal in shape and size.



By using an electrocardiograph, the physician can have a graphic record made of the fall and rise of the minute electric currents generated in the heart muscle as it contracts and relaxes. A study of this record, which is called an electrocardiogram, may tell the physician whether or not the heart muscle is in good condition and its action correct.\*

### What to Do if You Have Heart Trouble

A PERSON who is told by his physician that he has some form of heart trouble is apt to think that he is doomed to an untimely death. This is not true. Few people realize the wonderful work they can get from an impaired heart by using it skillfully and discreetly. The heart is a remarkable organ which can adapt itself to new conditions and very often compensate for the disturbances due to disease. However, a person whose heart has been damaged needs to regulate his manner of living so that he can give his heart the best possible chance to function adequately. Many patients with heart disease can lead useful and productive lives with but little restriction of their normal activities if they follow the advice of their physician in every respect.

If your physician tells you that you have some form of heart trouble, your chief problem is to understand how to regulate your play and work so that you will get enough but not too much physical exercise. Do not undertake or persist in any physical effort that might be called a strain. Find out from your physician what you may do and what you may not do, and plan your life accordingly.

Proper hours of rest at night are of great importance. When you are asleep the heart gets the most rest. Eight hours in bed should be the minimum—10 are better.

\*An electrocardiogram recording the action of a healthy heart is shown on the cover of this pamphlet, at the top. The record of the action of a damaged heart is shown at the bottom.



If you are overweight, your physician may put you on a diet to reduce your weight. Keeping your weight down to normal is one of the ways in which you may avoid placing a strain on the heart.

Follow the instructions the physician gives you for improving your general health so that you will be able to put up a strong resistance to infection. Remember that colds, sore throats, and other diseases due to germs sometimes serve to start a more or less prolonged illness in a person with a weakened heart.

Never take medicine for your heart except by your physician's orders. Some forms of heart disease may be benefited by medicine. But drugs which affect the heart are extremely powerful in their action and must be taken only under careful medical supervision.

Guard against worry and all intense emotional disturbances. The one who wins the fight with heart trouble is the one who leads a serene, well-balanced life.

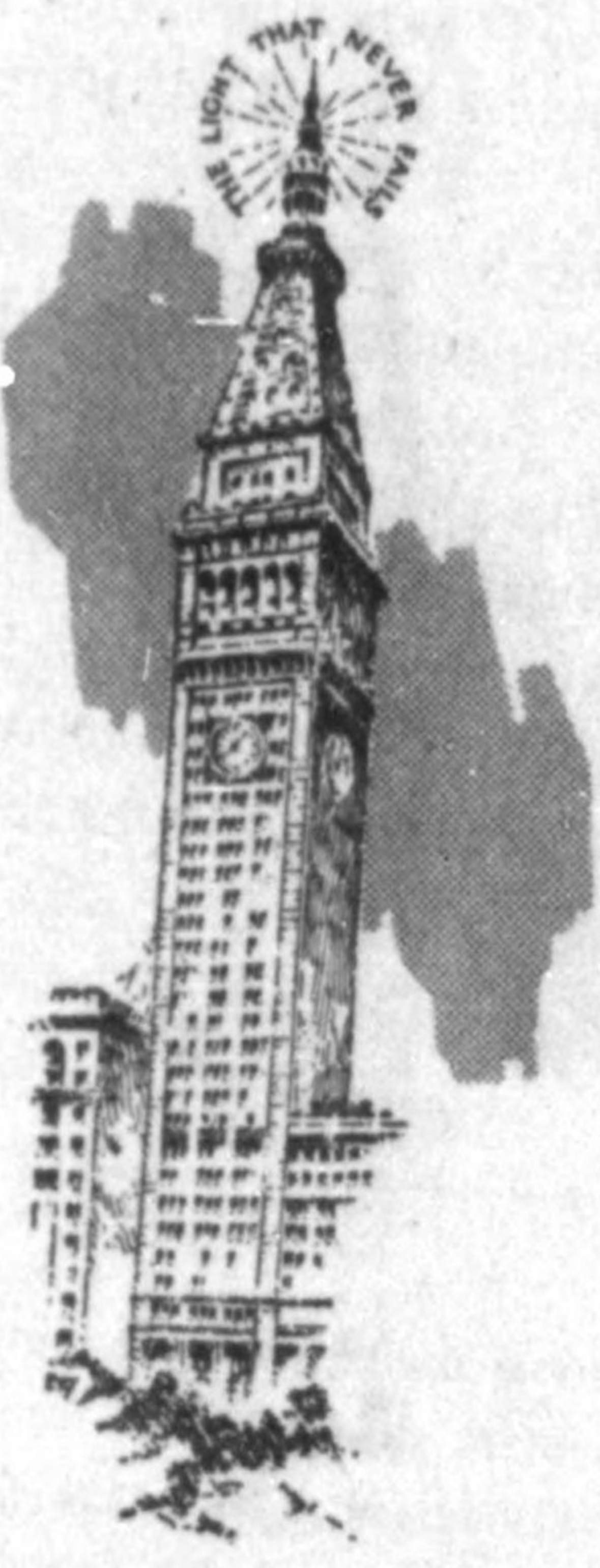
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For information about available clinics for those with heart disease, and for books and pamphlets relating to heart disease, write to the American Heart Association, Inc., 50 West 50th Street, New York, N. Y.

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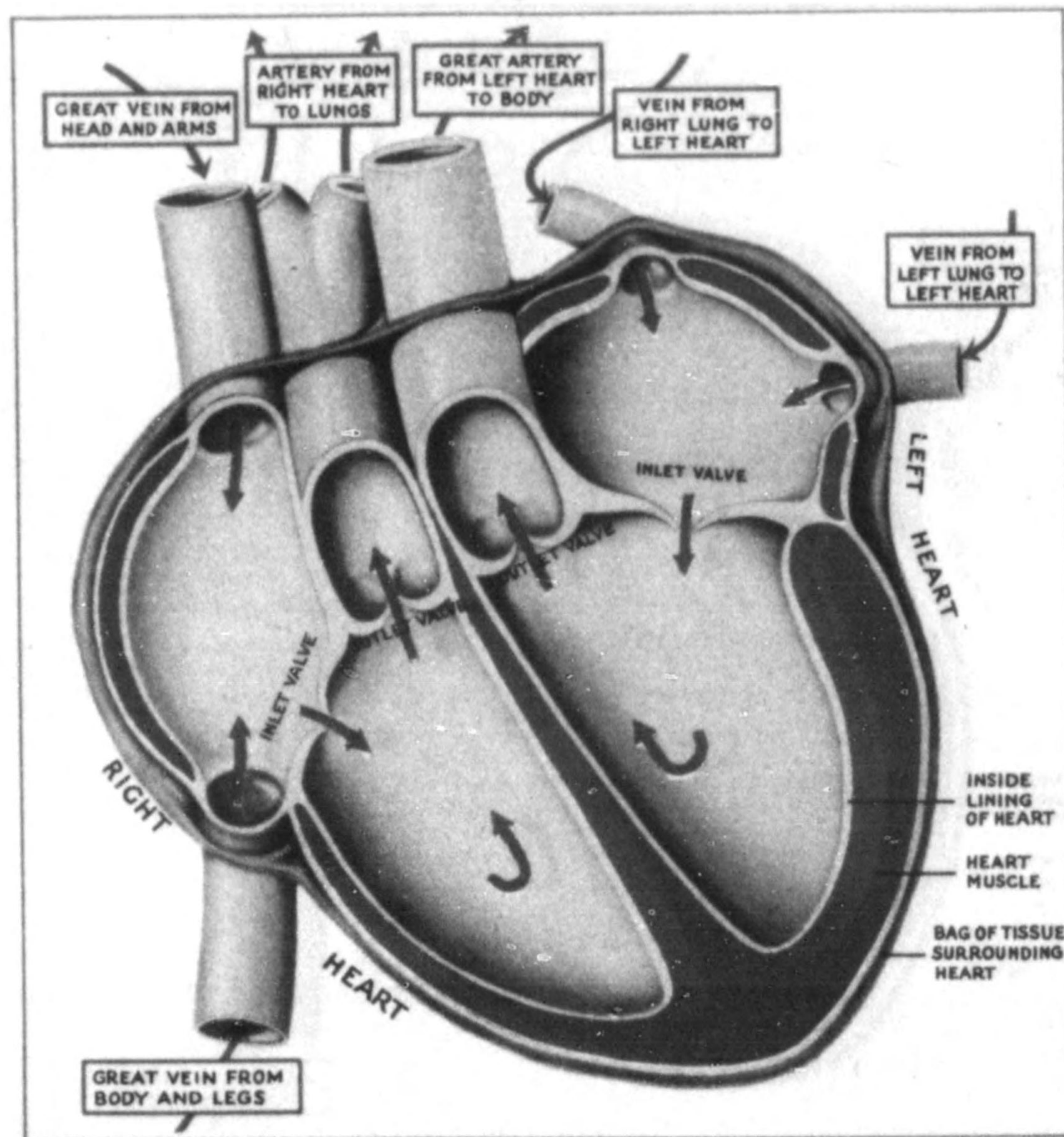
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# Your Heart

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**T**HE heart is a powerful hollow muscle divided, by a wall down the middle, into two main divisions — a right and a left. Each division has two chambers which work together as a unit. The blood stream flows from the body into the right side of the heart through veins. From there it is pumped to the lungs, where it gets rid of a waste gas (carbon dioxide) collected from the body cells and picks up a load of oxygen to carry to the body cells. After passing through the lungs the blood stream flows into the left side of the heart, from which it is pumped to the body through arteries.

The drawing on this page is not an exact representation of the heart in cross-section, but rather a pictorial diagram to show the course taken by the blood from the body → to the heart → to the lungs → back to the heart → and out to the body again.



## *Your Heart*

### It Is True —

**T**HAT there is an actual increase in heart disease, but this increase does not apply to all the people. Americans as a whole are living much longer than they used to live, because comparatively few lives are now cut short by the infectious diseases of childhood and youth. As a result there are many more older people in the population than there used to be, and it is in the older ages that the heart is most likely to get in trouble. The increase in heart disease that we hear so much about is primarily a problem of late middle and old age. In youth and early middle age there is much less heart trouble than there used to be.

### It Is Not True —

**T**HAT nothing can be done about heart disease. The heart may bear much and not break. It has tremendous reserves of power. The verdict of heart trouble in most cases does not mean death overnight. Thousands of persons with damaged hearts are living comfortable, happy, useful lives right now because they are cooperating with their doctors in giving their hearts a chance. Many of them may live as long as they could reasonably expect to live without heart trouble. Some of them even have a chance of complete recovery.

### HEART FACTS

**Y**OUR heart is only as big as your fist, but most of its bulk is muscle. It has just one job — to pump out into the arteries the blood returned to it by the veins. (See the pictorial diagram on the opposite page.) All the millions of cells in the body depend upon the rapidly circulating blood stream for the necessities of



life and the removal of wastes. The brain in particular must have a continuous supply of fresh oxygen. Since the brain runs the body, death comes within seconds — at most a very few minutes — after the heart stops beating.

The amount of blood in your body is comparatively small — it makes up only about 8 percent of your body weight. But to keep that blood in circulation through miles of blood vessels during an ordinary day of work, play, and rest, the healthy heart pumps from 9 to 10 tons of blood at an average daily rate of 70 strokes per minute. The normal pumping action of the healthy heart is a continuous series of regular contractions and relaxations — beat — rest, beat — rest, beat — rest, and so on for about 2½ billion times if the pumping continues for 70 years.

When you are "taking it easy," your heart takes it easy. It then rests nearly twice as much as it works. But during periods of exceptional physical exertion or emotional stress it may beat twice as fast as usual and pump out twice as much blood. The faster the heart beats, the harder it works and the less time it has to rest. On this important fact is based much of the medical advice we are given regarding the protection of the middle-aged healthy heart and the care of the sick heart.

### COMMON TYPES OF HEART DISEASE

**H** EART disease is a convenient term used to cover a multitude of different diseases, most of which are quite unrelated except as they all involve the heart or blood vessels.

The most common types of heart disease are those associated with infections, especially rheumatic fever and syphilis; or with high blood pressure; or with disease of the coronary arteries. Other less common but important types are caused by defects present in the heart or blood vessels at birth (congenital defects), or by overactivity or underactivity of the thyroid gland.



#### *The Young Heart*

##### Heart Disease Associated With Infections

Generally speaking, it is possible for the heart to become involved in practically any infectious disease if the germs causing it or their



poisons are carried to the heart in the blood stream, or if the heart becomes exhausted in the fight put up by the body against the disease. In these days, however, very few cases of heart disease are caused by infections other than rheumatic fever and syphilis. One important reason for this is that many communicable diseases are now being prevented by immunization, or are being treated successfully with serums or drugs before they have a chance to infect or weaken the heart.

Heart disease caused by an infection goes by the name of the part of the heart affected, plus the ending *itis*, which means "inflammation of." Hence we have myocarditis, inflammation of the myocardium, or heart muscle; pericarditis, inflammation of the pericardium, the bag of membrane enclosing the heart; aortitis, inflammation of the aorta, the great blood vessel leading out of the lower left chamber of the heart; and endocarditis, inflammation of the endocardium, the membrane which lines the hollow heart muscle. Since the endocardium covers the valves of the heart as well as its inner walls, endocarditis frequently leaves scars which may cause narrowing (stenosis) of one or more valves or may interfere with their proper closing.

#### *Rheumatic Heart Disease*

Rheumatic heart disease begins nearly always in childhood between the ages of 6 and 12 as the result of one or more attacks of rheumatic fever. Many cases of rheumatic heart disease in adults may be traced to a partly forgotten or mild attack of rheumatic fever or chorea (St. Vitus's dance) in childhood.

The cause of rheumatic fever, which plays such havoc with young hearts, is not clear. The solution to the whole puzzle is now one of the chief objectives of medical research. Just as a lighted match starts a fire in kindling already laid in a stove or fireplace, so an attack of a disease caused by germs of the streptococcus family — for example, tonsillitis, scarlet fever, or a streptococcal cold — often lights up rheumatic fever in a child or young adult who is susceptible to it. What makes an individual susceptible seems in most cases to be an inherited tendency to rheumatic fever, which may be increased by poor diet, inadequate protection from cold and damp, and crowded living conditions that give germs a chance to spread easily from throat to throat. Unfortunately, one attack of rheumatic fever makes a child more susceptible, rather than immune, to further attacks, and repeated attacks are more likely to damage the heart.



The earliest symptoms of rheumatic fever may be slight fever, nosebleeds, loss of appetite, failure to gain weight, and pain (often vague and fleeting) in joints and muscles. The uncontrollable twitching or jerking of the face, arms, or legs, commonly known as St. Vitus's dance, is sometimes a sign of rheumatic fever. This disease may attack all parts of the heart and, in some cases, clear up with little or no trace. But commonly it leaves scars in the endocardium which interfere more or less with the working of one or more of the valves of the heart. By following the advice of the physician with regard to work and play, individuals with rheumatic heart disease, whose hearts have not been too severely scarred, may lead productive and normal or near-normal lives.

Prompt and continuing medical care during attacks of rheumatic fever is essential, and good nursing care is of prime importance. The child must be kept in bed during the active stage in order to give the heart the rest it requires to make as good a recovery as possible. The doctor is the one to say when the child may get up and how active he may be as he returns to normal living.

The best, but not absolutely certain, protection against recurrences is periodic medical supervision, with emphasis on the proper balance between rest and activity, good nutrition, and protection from respiratory infections. The use of sulfa drugs under medical supervision to ward off the streptococcus infections which so often light up rheumatic fever is giving promising results in preventing recurrences in susceptible children.

#### *Syphilis of the Circulatory System*

Syphilis continues to be a common cause of infectious disease of the heart and blood vessels. This disease does more damage to the aorta than to other arteries or to the heart itself. Probably the germs (spirochetes) of syphilis invade the heart and aorta soon after they first enter the body, but as a rule actual disease of these organs does not appear for many years. Fortunately syphilis of the heart and arteries is now a preventable disease, since the spirochetes can be destroyed before they damage the aorta or heart if treatment is begun in the first, or chancre, stage.

#### *Bacterial Endocarditis*

This serious infection of the endocardium, or heart lining, is caused in most cases by an invasion of bacteria of the coccus family. These bacteria are much more likely to gain a foothold if rheumatic heart disease or a congenital defect or some other ab-



normal condition already exists. The rare acute form is caused by any one of several different kinds of bacteria which may enter the blood stream and attack the heart in the course of an illness elsewhere in the body — for example, pneumonia or meningitis. In the more common subacute form, streptococcus viridans (the green streptococcus) is usually responsible. This germ hides and multiplies in blood-clot nests in the endocardium. With the sulfa drugs and penicillin at the physician's disposal, the outlook for the control of bacterial endocarditis is much more hopeful than it was a very few years ago.



### *The Middle-Aged Heart*

#### **Heart Disease Associated With High Blood Pressure**

High blood pressure, or hypertension, is the most common cause of heart disease in middle age. What hypertension is and why it causes heart disease are known. But what causes hypertension itself is still a puzzling question. Many cases of hypertension are associated with disease of the kidneys (renal hypertension) or with a disease or functional disturbance of the nervous system or endocrine glands. The majority of cases of hypertension, however, are labeled "Cause Unknown."

High blood pressure which develops without any discoverable cause is called essential hypertension. It seems to run in some families, many members of which through several generations have had essential hypertension or troubles associated with it. Also it appears to be most common among people who are overweight.

#### *What "Blood Pressure" Is*

Everyone has blood pressure. It is simply the pressure of the blood against the walls of the arteries which are always completely filled with blood. Everyone's blood pressure goes up and down. It is highest during systole, the period when the heart pumps a fresh load of blood into the elastic-walled arteries which stretch to accommodate it, and lowest during diastole, the period when the heart pauses between beats to fill with blood. High blood pressure is commonly taken to mean high systolic pressure. However, the diastolic pressure is fundamentally the more important of the two, because it represents the basic pressure exerted on the arterial



walls independently of the additional pressure due to the contraction of the heart. The physician also attaches great importance to the relationship between the systolic and diastolic pressures. The difference between the two is called the pulse pressure.

The second factor which makes everyone's blood pressure normally an up-and-down affair is the way the arterioles behave during emotional stress. These tiny blood vessels are the smallest branches of the arteries. They are controlled by nerves which automatically make them constrict (tighten up) or dilate (open wider). They tighten up when you are all keyed up with joy, fear, anger, worry, or working under tension. When they constrict, less blood can get into them from the arteries, and so the pressure of blood in the arteries goes up. When the excitement is over they dilate (open wider), and the pressure goes down.

*Hypertension, or high blood pressure, means simply that through some nervous or toxic influence the arterioles throughout the body — and there are miles of them — are kept more or less constantly in a constricted, or tightened-up, state.*

*Hypotension, or low blood pressure, means that the blood pressure remains more or less constantly within or below the lower limits of normal pressure. Unlike high blood pressure, it does not cause heart disease. Indeed, low blood pressure seldom causes real illness of any kind, and definite diseases in which it occurs are very rare. Individuals who are physically below par, especially if they are underweight, may have hypotension. However, the blood pressure of many healthy individuals tends to be lower than the average for their age. If your doctor concludes that you are one of these "low-normal" individuals, you may consider yourself fortunate because you may expect to live longer than other people.*

#### *How High Blood Pressure Affects the Heart and Arteries*

The effect of hypertension on the heart is what you might expect if you screwed down the nozzle of a hose connected with a water pump. Just as the pump would have to work harder against increased resistance in the hose to keep water spraying out of the nozzle in the same volume as before, so the heart must work harder against increased resistance in the arteries to keep blood flowing through the constricted arterioles at nearly the normal rate. To take care of this extra work the heart muscle is forced to enlarge. And often, but not always, the walls of the arteries become scarred and thickened — a process called sclerosis, or hardening, of the arteries (arteriosclerosis).

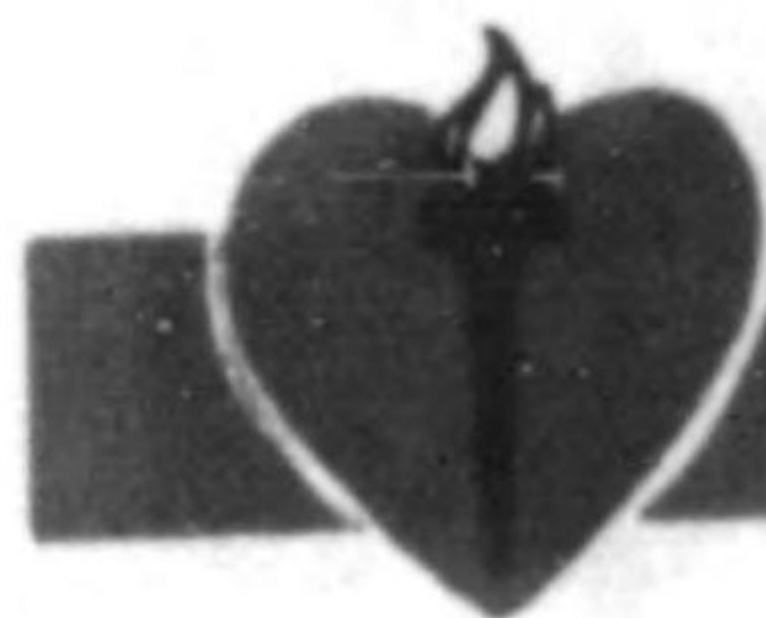
A strong heart and wear-resistant arteries may be able to cope



with high blood pressure for years without much trouble. In some cases there may be no symptoms at all; in others, there may be headaches, dizziness, general aches and pains, and possible shortness of breath. These symptoms also appear in other common conditions. Instead of wondering whether you have high blood pressure the sensible thing to do is to see your doctor.

Sometimes high blood pressure clears up of itself before it has a chance to damage the heart and blood vessels, or it may be lowered to a safe level by drugs or diet or surgery if it is discovered in time. Even malignant hypertension, a severe form of high blood pressure which often progresses very rapidly, has recently been treated with good results in some cases.

*Persistent high blood pressure*, however, nearly always results in enlargement of the heart muscle — the first step in the development of hypertensive heart disease. The progress of hypertensive heart disease to the point of heart failure can often be delayed for many years, even into old age, by following the doctor's advice and leading a life of moderation in all things — in work and play, in eating, in smoking, in emotional reactions.



### *The Aging Heart*

#### Coronary Heart Disease

Heart disease caused by disease of the coronary arteries, which have the job of supplying the heart muscle itself with blood, is most common after age 50. Thickening of the coronary arteries (coronary arteriosclerosis), usually associated with hypertension, is the chief cause of coronary disease. Its harmful effect on the heart is explained by the reduction of the blood supply of the heart muscle (the myocardium) which occurs when the coronary arteries are narrowed or blocked. However, the reserve strength of the heart muscle and its blood supply are both so great that they are not easily exhausted. Many people are able to live quite comfortably with coronary heart disease if they are careful not to place too great a strain on their hearts. With the object not only of prolonging their lives but also of enabling them to be useful and happy, the physician helps them to strike a balance between too



many and too few restrictions. The main thing to strive for is equanimity. Some people with a comparatively small amount of heart damage and disability make themselves worse through sheer nervousness.

#### *Angina Pectoris*

The inability of the coronary arteries to perform their duty properly is made plain by a symptom so important that it is often regarded as a disease in itself. This symptom is called *angina pectoris*. *Angina pectoris* is a painful, strangling, oppressive sensation under the breastbone, frequently radiating down the arms, which is brought on by exertion and lasts for only a few minutes. It is not like any ordinary pain in the chest, and a person who has had it once seldom needs to be persuaded to see a doctor.

#### *Coronary Thrombosis*

The most serious "accident" which may occur in coronary disease is the sudden closing (occlusion) of a coronary artery by a blood clot (thrombus). It causes severe crushing pain in the chest, accompanied by weakness, pallor, and sweating, which persists in spite of rest. Sometimes the pain is mistaken for acute indigestion. A doctor should be summoned at once, because this is a real heart emergency. However, the great majority of persons survive the first attack of coronary thrombosis, and most of the survivors live for many years. After the damage done to the heart muscle has had opportunity to heal through a long rest in bed, the heart has an excellent chance to recover sufficiently to allow normal or near-normal activities.

### SIGNS AND SYMPTOMS

It is important to realize that the heart may be innocent of causing many of the feelings of discomfort which are frequently blamed on it. The cavity of the chest and the upper part of the abdomen, which is separated from the chest by only a thin sheet of muscle, are packed tightly with organs. Any extra pressure, such as gas in the stomach or small intestine, for example, may give rise to pain in the chest with which the heart has nothing whatever to do. On the other hand, any discomfort in the chest which is directly related to exertion or excitement should be a signal to consult a physician.



The heart itself may at times act queerly without having anything organically wrong with it. Common but annoying experiences of this kind are skipped beats, palpitation (consciousness of the heart beat), and very rapid beating of the heart. Noticeable misbehavior of the heart beat, or any other annoying symptoms which may make you think you have heart trouble, should always be investigated by a physician. If the physician, after a careful examination, says that nothing is wrong with your heart, *believe him*. Many people make themselves miserable by continuing to think that they have heart disease, even after one or more physicians have told them that their hearts are sound.

There are a few symptoms which should *always* be investigated, because they indicate the need of medical attention whether they are due to heart trouble or not. One of these is shortness of breath when at rest or on exertion which has not previously caused breathlessness. Shortness of breath associated with moderate exertion is an early symptom of a weakened heart muscle. It is caused most commonly by the congestion of blood in the lungs which occurs when the left side of the heart fails to pump on all the blood it receives from the right side via the lungs. Sudden acute attacks of breathlessness may come on while in bed at night. When asthmatic breathing complicates this form of breathlessness, the condition is called cardiac asthma.

Swelling of the feet and ankles is another early sign of possible heart weakness. When the circulation is slowed up because the heart fails to pump with its customary vigor, fluid may gather in the tissues and cause swelling, which is usually first noticed in the feet and ankles.

### THE HEART-BLOOD VESSEL EXAMINATION

**T**HE ideal way to forestall the onset of heart trouble is to see your doctor for a check-up every year and to consult him between times at the appearance of one or more of the symptoms which *may* or *may not* indicate heart trouble or hypertension.

If you tell the doctor you are worried about your heart or your blood pressure, the first thing he will do is to ask you to describe your symptoms. Symptoms are indications of trouble, like pain, which only you can feel. As they give the doctor important information about you, it is essential that you describe them honestly



and carefully. The doctor will then proceed to look for signs of trouble — things which he himself can detect with the help of various instruments and tests.

#### Checking Up on Your Blood Pressure

In taking your blood pressure your physician will measure the amount of pressure exerted by the blood against the main artery of your arm at the peak of the heart beat (systole) and at the pause between beats (diastole). The apparatus the doctor uses is familiar to almost everyone because blood pressure is now measured in the course of practically every medical examination, although this procedure came into general use only a generation ago.

If necessary, the doctor will also examine the interior of your eyes with an instrument called an ophthalmoscope, which enables him to see the minute blood vessels at the back of the eye. Since these blood vessels are similar to those in other less accessible regions of the body, the ability to observe them directly gives the doctor an idea of how good your blood vessels are. From an analysis of your urine (urinalysis), and perhaps by other tests of kidney function, your doctor will gain valuable information about the condition of your kidneys. This knowledge is important because high blood pressure or hypertensive heart disease is sometimes associated with kidney disease.

#### Checking Up on Your Heart

Usually the physician first feels (palpates) and taps (percusses) the cardiac region of the chest to determine the position, size, and shape of your heart. In addition, he may ask you to stand behind the screen of a fluoroscope while he studies the shadow of your heart cast by X-rays on the screen. To have a permanent record for further study and future comparison, he may also have an X-ray picture taken.

By listening to the sounds made by your heart in action through a stethoscope, which magnifies them, the doctor is able to detect "murmurs" or other deviations from normal. Heart murmurs are gentle, blowing sounds which may or may not indicate that something is wrong with the heart. A great many murmurs have little or no importance. Others may indicate that damage has been done to the valves or heart muscle as a result of rheumatic heart disease or some other condition.

The physician may also wish to have an electrocardiogram made.



This is a written record of the electrical activity which sweeps down and over your heart at each heart beat. The sensitive apparatus that does the writing at the dictation of the heart is called an electrocardiograph. The physician can tell whether the wave patterns recorded in an electrocardiogram are normal or abnormal, and so gain additional evidence about the condition and action of your heart muscle.

In addition to these methods of examining the heart, there are many others which your doctor will use if he thinks it necessary. For example, the extent and speed with which the red cells of the blood settle down when a sample of blood is allowed to stand in a column (sedimentation test) is a valuable means of uncovering rheumatic and other infections. Determining the way the heart behaves in various forms of physical exercise may be used in testing the heart's function. In short, there are now so many ways of taking the guesswork out of the heart examination that it is no wonder that our doctors today are able to make more accurate diagnoses than could doctors in the old days.

### LIVING WITH HEART DISEASE

If the doctor finds that you have any form of heart trouble after making his examination, he will tell you because he must depend upon your cooperation. He has at his command many potent drugs and new surgical techniques, but he cannot live your life for you. And in the long run it is the way you live, more than the medicines you take, that determines how long and how happily you will live with an impaired heart.

The object of the way of living which doctors usually recommend for persons with heart trouble is the lifting of all removable burdens — for example, those imposed by fatigue, obesity, infections, and emotional upsets.

#### Exercise and Rest

The speeding up of the heart's action which accompanies sudden or violent or prolonged physical exertion can easily be accommodated by healthy young hearts, but it puts an extra and unnecessary strain on damaged or middle-aged hearts. The amount of exercise which a person with heart disease or high blood pressure may take will be carefully prescribed by the physician, and the patient must use judgment and discretion in carrying out the



doctor's advice according to his ability to perform without getting tired or out of breath.

Things to remember are:

- ¶ 1. Don't *run* or walk fast to catch anything — train, bus, streetcar, plane, or any other vehicle. As the saying goes, "It is better to miss it and live than catch it and die."
- ¶ 2. Don't walk against a high wind, as this throws an extra strain on the heart.
- ¶ 3. Don't do any more climbing than is necessary — if you must go up stairs or up hill, do it slowly with frequent rests.
- ¶ 4. Slow up — use moderation — in everything you do. Get out of bed slowly — never jump out. Cut down the speed at which you work, or work for shorter hours if possible. The doctor may advise a change of occupation if your present work is too fatiguing.
- ¶ 5. Go to bed early. Take a nap or at least lie down during the afternoon. When you are asleep or resting, your heart gets extra rest.

#### Eating

Eating big meals taxes the heart, since its work is increased during digestion. Also, *overeating is the most common cause of obesity, and carrying around an extra load of fat puts extra strain on the heart.*

When a person is sick in bed with heart trouble, the physician usually restricts the amount of food and fluid allowed. In all cases, moderation in eating is usually advised both to keep weight down and to lighten the work of the heart. Five or six light meals a day are sometimes better for the heart than three large, heavy meals. In some cases the doctor may prescribe a special diet. There is no one special diet which will apply in all cases. Specific dietary instructions must be provided by the physician to fit the need of each individual.

#### Smoking

So far as we know now, smoking tobacco does not cause actual heart disease, but excessive smoking may cause disagreeable disturbances of the heart beat, even in healthy people, and aggravate the symptoms in certain types of heart disease. Recent experiments have shown that smoking tobacco makes the arterioles tighten up, just as they do under emotional stress, and constriction of the arterioles raises the blood pressure. Hence smoking may have a harmful effect in arteriosclerosis and in heart disease associated with arteriosclerosis and high blood pressure. A person with heart



trouble or hypertension may feel better if he avoids the use of tobacco, and in some cases the physician may forbid smoking.

#### Avoiding Infections

A person whose heart is already handicapped must take care to avoid the added burden and possible risk of further damage imposed by infections, such as colds, sore throats, pneumonia, and infections of the sinuses and teeth. Anyone with heart trouble who develops an acute infection should go to bed and call his doctor. On recovery he will require a longer convalescence and a more gradual return to work than would a person with a normal heart.

#### Keeping in Touch With the Doctor

A person with heart trouble must keep in close touch with his doctor. His diet, weight, activity, rest — in short, his way of life — are more important than drugs and require constant medical supervision. Although some forms of heart disease are benefited by medicines, the drugs employed are extremely powerful, and their effect on a particular patient must be checked frequently.

#### Philosophy of Life

Cultivating a serene, optimistic outlook on life helps a great deal in relieving an impaired heart of unnecessary strain. This may be difficult for people who have always been high-strung — quick on the emotional trigger — prone to work too hard or worry too much. Yet the people who are willing to slow up their previous living pace — to go ahead with less speed, less haste, less worry, less fear; who accept the situation and adjust to it cheerfully, coaxing their hearts along without letting their impairment become an obsession—these are the people who have the best chance of a full, happy, and prolonged existence *despite* heart trouble.



Other *Metropolitan* pamphlets which may be of interest to the reader are as follows:

*Overweight and Underweight*  
*The Family Food Supply*  
*Rheumatic Fever*

*Respiratory Diseases*  
*Good Teeth*  
*Spotlight on Venereal Diseases*

The text of this pamphlet was prepared with the cooperation and advice of the American Heart Association, 1790 Broadway, New York 19, N. Y. For information about other publications relating to heart disease, write to that Association.





The "Heart and Torch" is the symbol of the American Heart Association



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# SIMPLE GOITER

METROPOLITAN LIFE  
INSURANCE COMPANY

HOME OFFICE: NEW YORK

Pacific Coast Head Office: San Francisco

Canadian Head Office: Ottawa



**Goiter** is a disease of the thyroid gland, usually accompanied by enlargement of the gland. This gland lies in the front of the neck. It secretes a substance containing iodine which influences growth and other body activities. This secretion is called *thyroxine*.

Great advance has been made in recent years in our knowledge of goiter. This disease is still being investigated. It is hoped that in the future we shall have a much more complete understanding of glandular substances and their effect on the chemistry of the body.

#### *Different Kinds of Goiter . . .*

**T**HERE are several kinds of goiter—the simple type, the toxic type, and other types in which the gland continues to enlarge. The size of a goiter is no indication of the amount of damage it may inflict upon the system. Some of the most dangerous, or toxic, goiters, especially those that tend to do serious damage to the heart, may show little or no apparent enlargement of the thyroid gland. In other dangerous goiters the gland may become greatly enlarged. When enlargement of the gland causes disfigurement or pressure, an operation may be necessary.

Simple goiter is the most common type of goiter. It is less serious than other types and is the most easily prevented and controlled. Simple goiter appears as a swelling in the neck just below the Adam's apple. It affects children and grownups of both sexes, but it is especially common in girls. It usually occurs in adolescence and has a tendency to disappear around age 25.



*This 12-year-old girl has a small simple goiter.*

A doctor is the only person qualified to distinguish between the various types of goiter. For this reason it is important that a person with any enlargement of the thyroid gland con-



sult a doctor promptly. The doctor will know what type of goiter is present and what treatment will be appropriate.

#### *The Cause of Simple Goiter . . .*

A PERSON who has simple goiter is not getting enough iodine to supply the body's requirements. It appears that the thyroid gland enlarges in an attempt to make up for the lack of this substance. This iodine lack may be caused in several ways: (1) There may not be enough iodine in the diet. (2) The body may not be able to absorb the iodine present in the diet. (3) The body for some reason may need more thyroxine, the iodine-containing substance secreted by the thyroid gland.

#### *When the Needs of the Body for Thyroxine Are Increased . . .*

SIMPLE goiter is most apt to appear at a time in life when there is an increased demand on the part of the body for thyroxine. This increased demand occurs during puberty, pregnancy, the menopause, and during or following a chronic or acute infection.

#### *Lack of Iodine in the Diet . . .*

MANY common foods contain iodine in small quantities, especially in regions near the seacoast. In these regions simple goiter is rare. In other districts the amount of iodine in the soil, water, and foodstuffs is low. Simple goiter is more common in these localities than elsewhere, and for this reason they are known as "goiter districts." In these districts enlargements of the thyroid gland have been found in boys as young as 6 years old and in girls 8 or 10 years old.

Those who have studied goiter agree that in simple goiter, without symptoms other than the slight enlargement of the gland in the neck, the feeding of very small amounts of iodine will often hasten the disappearance of the swelling.



No one should take iodine for enlargement of the thyroid gland without the advice of a physician. If the enlargement is not due to simple goiter but to a more serious condition, iodine may make matters worse instead of better. In some cases it may cover up the seriousness of the condition for a time, until it is too late for the doctor to treat the goiter successfully even with surgery.

#### *Use of Iodine in Preventing Simple Goiter . . .*

**I**N COMMUNITIES where simple goiter is common a small amount of an iodide taken once a week during the periods of life when the thyroid gland is most active will prevent goiter of this type in the majority of cases. Iodine for the prevention of simple goiter should not be taken in food preparations without the approval of a competent physician who will advise the patient as to the amounts to be used and the times for taking it. In the schools of some communities each child is given, once a week, a chocolate tablet containing iodine. The use of a medically approved iodized salt is a practical and economical way of supplying a family's iodine need in districts where iodine is lacking in the diet. For most people this is a safe and simple method of preventing simple goiter before it appears. If the doctor advises the employment of iodized salt as a goiter preventive, it should be used only in quantities that correspond to the usual salt consumption. No other special food preparation containing iodine should be used at the same time unless the doctor orders it, as overdosage with iodine may be dangerous to health.

Although iodized salt or any other medically approved preparation may act to prevent simple goiter before it appears, it is not a cure. The treatment of goiter is a medical problem, and a person who has goiter should put himself under the care of a competent physician.

**AFTER GOITER HAS APPEARED, NO FORM OF IODINE  
SHOULD BE TAKEN WITHOUT A DOCTOR'S ADVICE**



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what about

# RHEUMATIC FEVER?

What is rheumatic fever?  
Is it contagious?

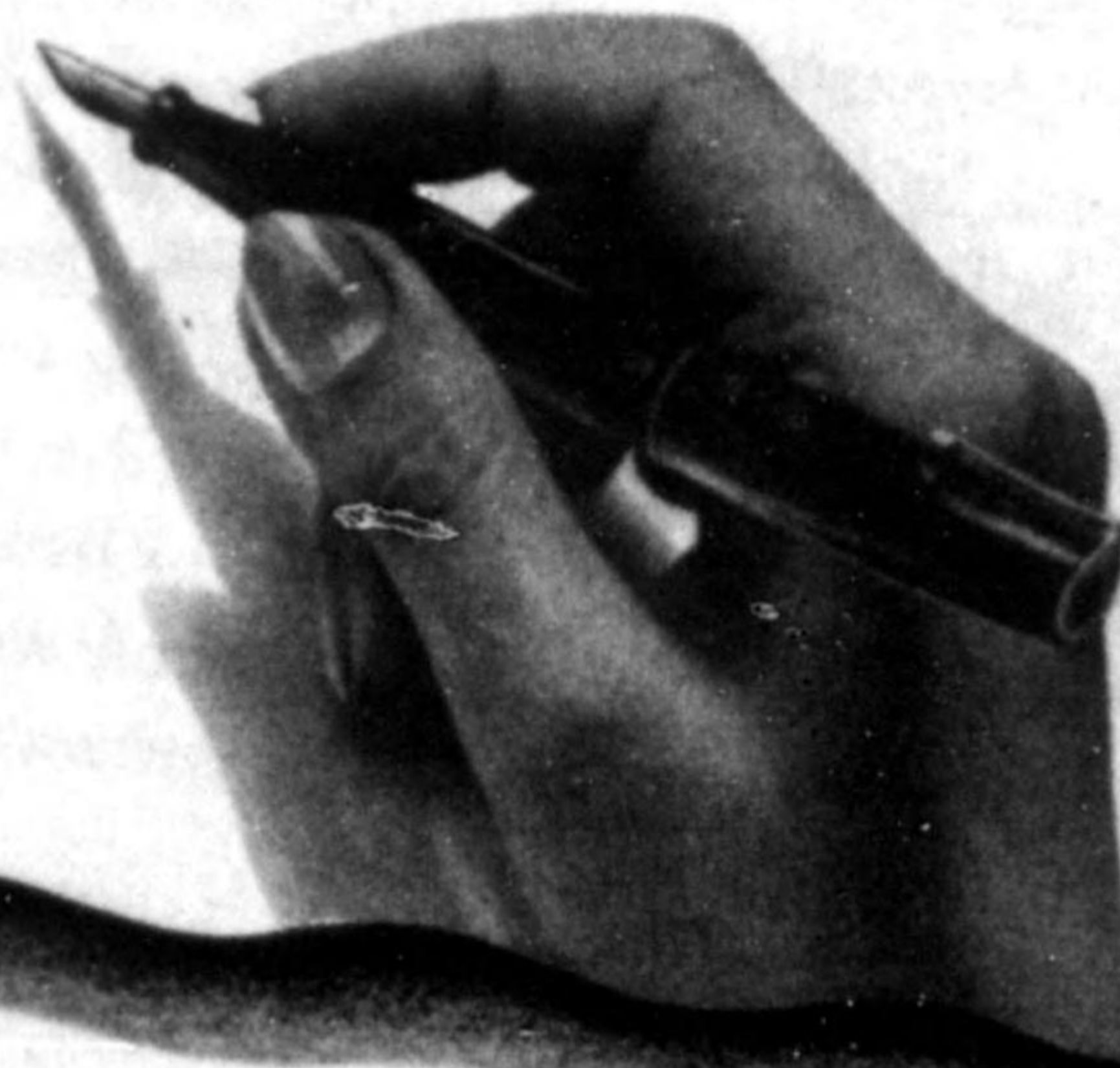
How can I tell if my child  
has Rheumatic fever?

Will he outgrow it?

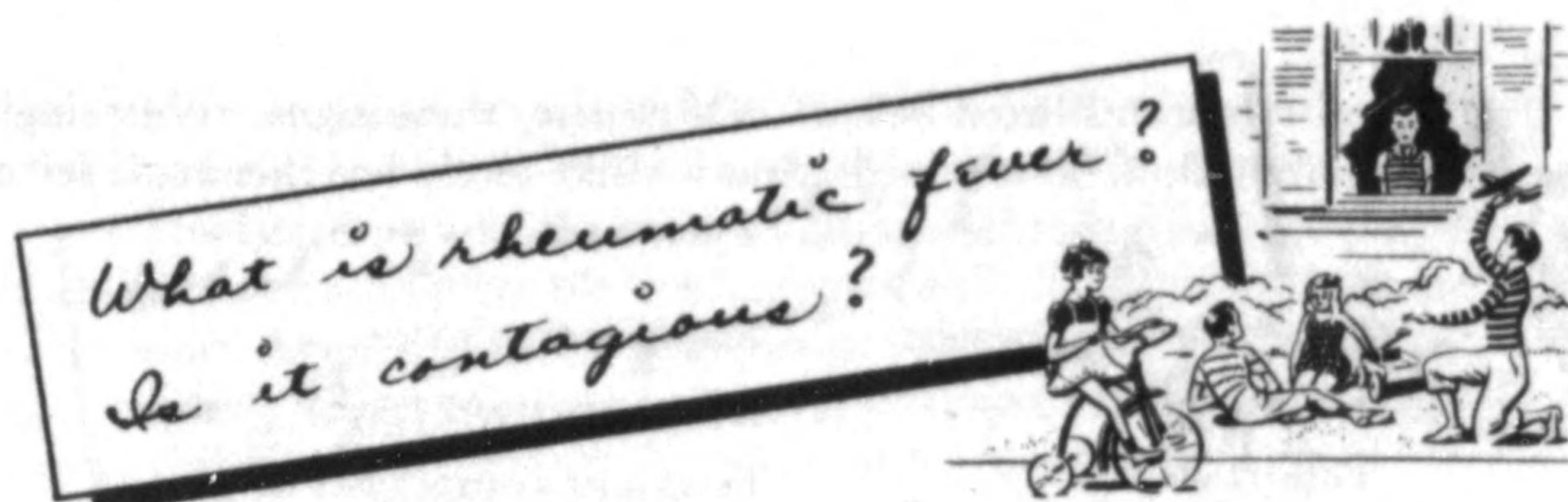
When can he get up?

Will a change of climate help?

Does it always damage  
the heart?



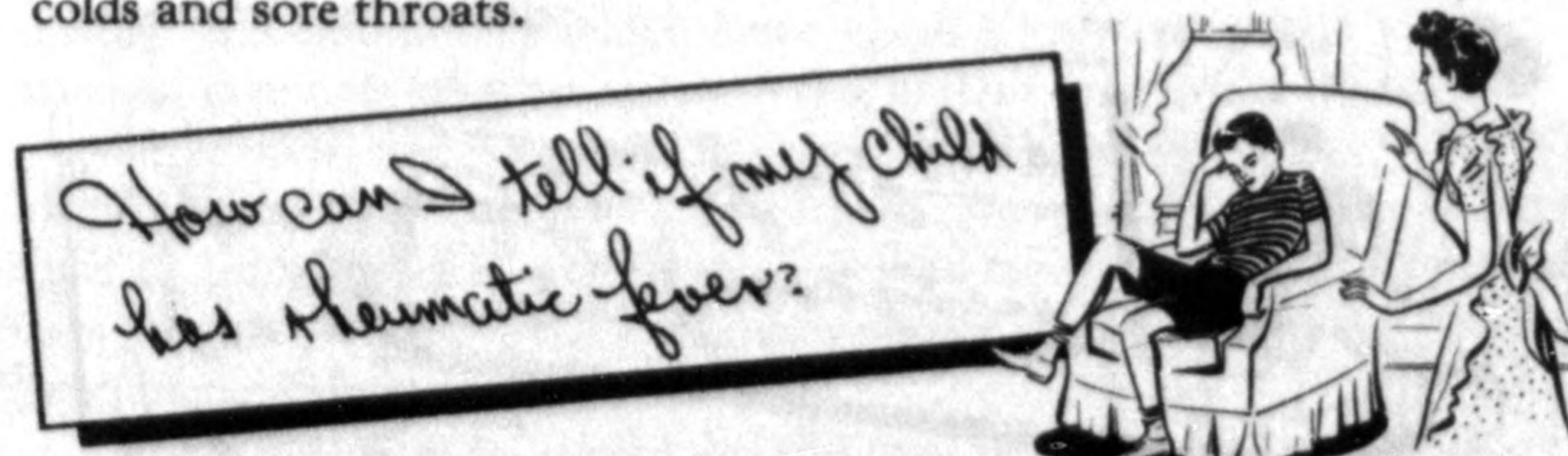




It is generally agreed that rheumatic fever is an infection. An infection is a disease caused by a germ or a virus.\* The particular germ or virus responsible for rheumatic fever has not been discovered, but it has been discovered that rheumatic fever is not spread in the same way that easily caught infections like chickenpox and measles are spread.

This leads to the belief that children who do get rheumatic fever are especially susceptible to it. Recent studies seem to show that special susceptibility to rheumatic fever is inherited. That is, it tends to run in families. It is probable, however, that inherited susceptibility and one or more other things *working together* make a child liable to attacks when he reaches the age at which the disease is apt to develop. Among these "other things" are frequent chilling, damp or overcrowded living quarters, a poor diet, a recent attack of scarlet fever, tonsillitis, a bad cold, or some other infection caused by certain streptococcus germs.

There is no need to worry about letting healthy children play with a child who has had rheumatic fever because of the danger of contagion. However, parents of children who have had rheumatic fever should be very careful to protect such children from other people's colds and sore throats.



Sometimes it is hard, if not impossible, to recognize rheumatic fever when it first begins, because the early signs in some cases are so slight. A rheumatic attack may be accompanied in the beginning by any of the

\*A virus is a disease agent much smaller than a germ.

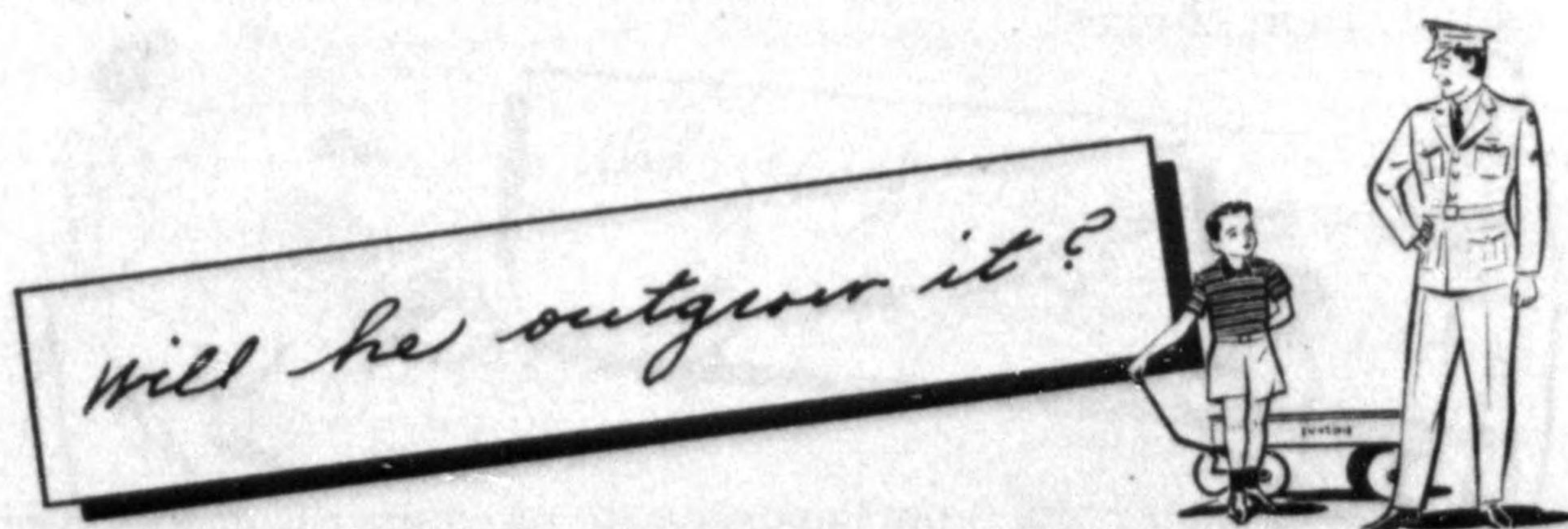


signs and symptoms listed below. Of course, these signs, either singly or in combination, do not mean that a child surely has rheumatic fever, but they do mean that he should be examined by a physician.

Failure to gain weight.	Rapid heart action.
Poor appetite.	Low persistent fever.
Pallor.	Frequent complaints of pain in the arms, legs, or abdomen.
Repeated nosebleeds.	

More definite signs of rheumatic fever include small lumps (nodules) under the skin, and painful, inflamed joints. Chorea, usually known as St. Vitus's dance, is now recognized as a manifestation of rheumatic fever. This condition causes uncontrollable twitching or jerking of the face, arms, or legs, and emotional disturbances. If a child gets irritable without good reason, begins to cry easily, doesn't act like himself, or develops nervous habits, a physician should see him. Children with these symptoms may not have St. Vitus's dance, but their condition makes an examination advisable in any case.

It is very important to find out whether an attack of rheumatic fever has damaged a child's heart. For that reason the physician may wish to have the child examined by a heart specialist. In many communities there are cardiac (heart) clinics in which heart specialists are available for consultations. It sometimes happens that rheumatic heart disease is first suspected in the course of a child's school medical examination. It is easy to see how important it is to have this finding checked either in a cardiac clinic or by a heart specialist in private practice.

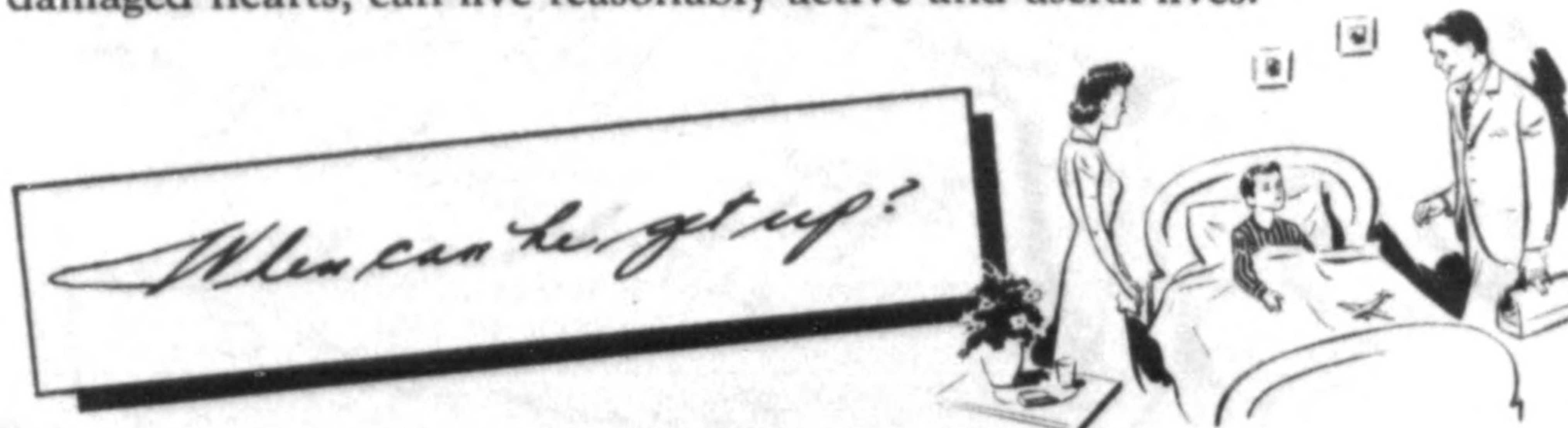


The first attack of rheumatic fever is apt to strike susceptible children when they are about 5 or 6 years old. The body does not build up any special protection against rheumatic fever. Although many



children have only one attack, others are likely to go on having them. During the teens, recurrent attacks often become fewer and fewer and, in many cases, at about 15 or 16 years of age they stop altogether. In this sense, many young people do "outgrow it." However, adults can and do have rheumatic fever, some even for the first time, although most attacks in adults are believed to be recurrences of attacks which began in childhood.

The greatest danger from rheumatic fever is the damage which it does to the heart. This damage, which occurs fairly often although not always, cannot be outgrown. However, with care in choosing work and play, people with rheumatic heart disease, even many with severely damaged hearts, can live reasonably active and useful lives.



A child with rheumatic fever should not be allowed to get up until the physician permits. It is vitally important that the heart be spared all unnecessary work for as long as the disease is active and for the period of convalescence afterwards. The physician is the only one who can judge when it is safe to let the child get up, and his directions should be followed *exactly*, no matter how well the patient feels or how slight the attack seems. Good nursing is important for rheumatic fever patients. In communities which have visiting nurse service, a visiting nurse can give help of great value to the patient and to the doctor.

As convalescence progresses, it can become quite a problem to keep a child reasonably content to stay in bed. First of all, he should be helped to understand that staying in bed is temporary, and that the things he can do later on depend largely on doing now exactly what the physician wants him to do.

If a visiting nurse is coming in, she may be able to help find ways to keep the child occupied. She will know of other services available to bedridden children, such as home teachers who help a child with his school work and other trained workers who teach games, handicrafts, and all sorts of skills and amusements. Where these services are not