Beaver Dam Studies
Vision and Hearing Loss

• Become more frequent as people age
• Quality of life
• Function
• Independence
Needs in 1980s

• In the early 1980’s there was little information on:
  – The frequency of age-related eye diseases and hearing loss
  – How often these conditions occur and progress
  – Risk factors associated with these conditions
  – How these conditions affect function
Importance

• Information important for:
  – Understanding risk
  – Identifying risk factors to prevent conditions from occurring
  – Planning for health care services
Funded by the National Eye Institute

Beaver Dam To Be Subject Of Major Eye Study

By JEFF HOVIND
Editor

Beaver Dam has been chosen as the site of a major eye study that will involve up to 5,700 Beaver Dam residents. The study is funded by the National Eye Institute, in conjunction with the University of Wisconsin.

Beginning in September, researchers will call all households in both the City and Town of Beaver Dam. They will be looking for residents between the ages of 45 and 84, to set up appointments in the spring for free comprehensive eye exams. The exams will be conducted at Hillside Hospital.

The study will focus on the effects and causes of age-related eye disease, according to participating doctors. Local ophthalmologists Alan Ehrhardt and George Davis will be working with Drs. Barbara Klein and Ronald Klein of the UW Eye Department.

“CATARACTS, macular degeneration, and glaucoma are the leading cause of visual loss in this country,” a project new release points out. “At this time, little is known about the actual number of people affected by these disorders or what the causes of their problems are.

“Doctors throughout the country need more information about these conditions. The best way to get this information is to examine the eyes of a large number of people.”

To that end, the Beaver Dam study will be conducted.

Why Beaver Dam?
First, Beaver Dam has an estimated 5,700 people in the study age brackets, and the researchers were looking for a target group of about 5,000. Also, Beaver Dam is perceived to have a stable population.

But perhaps more important was the cooperation of Beaver Dam citizens in a previous study, according to researchers.

“People were most receptive, we had 100 percent participation and they all showed up on time,” Dr. Barbara Klein said. “We will again be depending on the good will and cooperation of all the people in Beaver Dam.”

The study is expected to be a major advancement in the study of eye diseases and their causes.

THIS FALL, researchers will contact all households to introduce themselves and ask a few questions about eye care.

Beginning in March, all residents 45-84 will be contacted to schedule the free exams.

The exams will include a blood pressure check, some questions about medical history, and color photographs of the eyes will be taken. The exams will last about an hour, and participants will receive a summary of their results.

“We look forward to working with you in Beaver Dam. With your assistance, we hope to find information that will help prevent or delay the onset of these eye diseases,” Dr. Klein concluded.

For more information, call 1-800-362-3020 and ask for the Beaver Dam Eye Study.

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Beaver Dam, Wis., 30 Cents

Weather: Thunderstorms likely tonight, some storms may contain damaging winds and large hail, lows in the middle to upper 60s. A 30 percent chance of early morning showers Saturday, then becoming mostly sunny, breezy and cooler, highs in the middle 70s to around 80.

Temperatures: Thursday's range was 62 to 89. A year ago it was 73 to 79. At 6 a.m. today it was 74 and at 10 a.m. it was 84.
Why Beaver Dam?

- Representative of small communities
- Size
- High participation in earlier study
- Support of community leaders, physicians, and eye doctors
- Proximity to Madison
The Community Advisory Board for the Beaver Dam Eye Study, involving 4,931 people, met Friday to hear a report about how the study is progressing. Pictured from left, seated, are: Barbara Brancel, Sarah Baumgart, Kathy Peterson, Erik Dasbach. Middle row: Moreen Meuer, Back row: Dr. Paul Youngdale, Rev. Ernest Norquist, Dr. Ronald Klein, Bea Greiner, Norma Dorn, Helen Soldner, Dr. Dennis Fryback.

Community Advisory Board
• Census
• Invitation
• Study evaluation
• Information back to participants and doctors
• Analysis of information
• Presentation at meetings
• Publication in scientific journals
The world is watching BD Eye Study
Local study used as model for international research

(Editors Note: The Daily Citizen, with researchers and staff involved in the Beaver Dam Eye Study, are presenting a 15-part series exploring the findings of the study.)

By RONALD KLEIN, M.D.

The Beaver Dam Eye Study developed new methods to photograph the lens of the eye. This was necessary to document the severity of cataracts (opacities of the lens) and age-related maculopathy (degeneration of the central part of the retina).

And results from the Beaver Dam Eye Study have come to the attention of other investigators around the world.

In Australia, under the leadership of Dr. Paul Mitchel, the Blue Mountain Eye Study was begun early this year. Dr. Mitchel visited Beaver Dam in September 1990 to observe the examination and photography and adopted many of those methods to his study.

THE AUSTRALIAN study involved the cities of Katoomba and Leura with a population of 11,522 people in the Blue Mountains just west of Sydney. A census identified 4,200 eligible people.

As in Beaver Dam, participants in the study are undergoing an examination which includes questions about their past and current health, diet, blood pressure, height and weight, and an eye examination which includes photographs of the lenses and retinas of both eyes.

ANOTHER STUDY in the Netherlands, the Rotterdam Elderly Study, began in September 1990 and involves 10,000 men and women living in a town near the city of Rotterdam.

Drs. Barbara and Ronald Klein visited Rotterdam to speak about the methods used in the Beaver Dam Eye Study. As a result, the eye part of this study, under the leadership of Dr. Paulus de Jong, began using these methods to detect and measure age-related maculopathy.

The aims of these three studies are similar.

They will estimate the frequency and development of age-related eye diseases, their affect on vision, and potential factors that may be related to the development of these eye diseases.

The use of similar methods of measurement and classification of cataract and age-related maculopathy, developed and used first for the Beaver Dam Eye Study will permit new understandings of these diseases from three different parts of the world.

Next: Beaver Dam Eye Study II - a second round of eye tests will help re-
Population-Based Eye Studies Using Methods Developed in Beaver Dam

- Andhra Pradesh Eye Disease Study
- Baltimore Eye Study
- Barbados Eye Study
- Blue Mountains Eye Study (BMES)
- Copenhagen Eye Study
- European Eye Study
- Los Angeles Latino Eye Study (LALES)
- Visual Impairment Project (VIP-Melbourne)
- Oslo Macular Study
- Pathologies Oculaires Liees a l'Age (POLA)
- Proyecto VER
- Reykjavik Eye Study
- Rotterdam Study (RS)
- Salisbury Eye Evaluation (SEE)
Age-related Macular Degeneration

• When we began study little or no information regarding:
  – The incidence and progression of disease
  – Its risk factors
  – Treatments to prevent or restore vision in its late stages
What We Learned About Age-related Macular Degeneration (AMD)

- High incidence of late dry and wet disease
  - 25% over 15 years in people 75+ yr old at baseline
- Smoking
- Heavy alcohol consumption
- Hypertension
- Chronic inflammation
- Sedentary life style
- Genetic factors
- Antioxidant multivitamins may reduce incidence and progression of late wet and dry AMD
Smoking a Danger to Eyesight

By Jamie Talan
STAFF WRITER

Cigarette smoking has taken another hit from science: A pack a day can double or triple a person’s risk for visual impairment, even blindness, decades later, two long-term studies indicate. And there is no reversal of the visual effects in people who quit.

“This will have far-reaching implications,” said Dr. Everett Ai, director of the retinal unit at California Pacific Medical Center in San Francisco. “These results are striking. Smoking puts people at high risk for macular degeneration.”

Each year, millions of elderly people develop macular degeneration, a condition that causes fuzzy vision, even blindness. Damage to the macula, part of the retina, results in a severe loss of central, or fine detail, vision. What triggers the damage is not known.

The latest studies, both of which appear in today’s Journal of the American Medical Association, suggest that in men and women smoking can greatly increase a person’s risk of macular degeneration. In one study, Dr. Johanna Seddon and her colleagues at the Massachusetts Eye and Ear Infirmary in Boston analyzed data collected from 81,843 nurses who were between 50 and 59 in 1980 when the study began. These women were followed for 12 years, and information on smoking habits was updated every two years.

Women who smoked 25 or more cigarettes a day were 2.4 times more likely to have macular degeneration, the leading cause of blindness in people over 65, than those who didn’t smoke. Even in women who stopped smoking more than a decade before, the risk was still two-fold.

The other study had similar results. William Christen and his colleagues at Brigham and Women’s Hospital and Harvard Medical School, followed 21,157 male doctors who were also part of a long-term health study. The men were 40 to 84 when they entered the study in 1982, and the analysis included only those who did not have macular degeneration when they entered the study. The increased risk was 2- to 3-fold greater in men who had ever smoked compared to never-smokers. In the physician study, even men who quit 20 years ago had slightly less than double the risk.

“The risk was related to accumulated lifetime exposure,” Christen said. “The more they smoked, the greater the risks.”

“The information is sufficient so that physicians may be willing to go a bit beyond the data to suggest that not smoking may reduce the loss of vision,” said Drs. Ronald and Barbara Klein, physicians at the University of Wisconsin Medical School who wrote an accompanying editorial in the journal.

A few years ago, analysis of these same studies found a similar increased risk for the development of cataracts, a clouding of the lens.

There are several possible explanations for the increase of visual loss due to smoking. Cigarette smoke could cause vascular changes in the blood supply to the retina. It reduces good types of cholesterol and produces damage to blood vessels, Seddon said. Tobacco also produces a number of so-called oxidants, substances that can lead to oxidative stress on the retina. Smoking may also reduce blood levels of circulating anti-oxidants, which protect cells from damage.

At present, there is no treatment for the majority of patients with macular degeneration. Laser surgery is effective in only 5 percent of cases, and there is now evidence that people who smoke do not recover vision after surgery as much as those who never smoked.

“This is a major avoidable cause of macular degeneration,” said Seddon, who found that of the 215 cases of newly diagnosed macular degeneration, 29 percent were triggered by smoking.
Much remains to be understood regarding the prevention or slowing the progression of AMD
BD study focuses on 3 eye diseases

(Editors Note: The Daily Citizen, in conjunction with researchers and staff involved in the Beaver Dam Eye Study, are presenting a 15-part series exploring the findings of the study which began in 1988 and involved nearly 5,000 area residents. Today: The study confirmed the relationship between aging and eye diseases.)

By RONALD KLEIN, M.D.

As people grow older, especially after 75 years of age, they are more likely to have difficulty reading and identifying distant objects due to a decline in vision.

This often leads to a decrease in their quality of life. The most important causes for this decrease in vision are three eye diseases related to aging: cataract (a clouding of the center of the lenses of the eye), age-related maculopathy (a degeneration of the central part of the back layer of the eye, the retina) and glaucoma (damage to the nerve of the eye usually due to increased pressure in the eye).

The figure at right shows the parts of the eye which are affected by these diseases.

UNTIL RECENTLY, it was not known how common these diseases were and how frequently they led to decrease in vision. In the Beaver Dam Eye Study, 1 percent of people 43-54 years of age had some form of visual impairment not corrected with glasses or contact lenses; this increased to 21 percent in those 75 years of age or older.

Based on this information, researchers estimate there are about 1.9 million people in the United States 75 years of age or older who are visually impaired and 258,000 who are blind.

In Beaver Dam, visual loss was more frequent in women than in men. The most common reasons for decrease in vision in Beaver Dam were macular degeneration, glaucoma, and cataract. Less frequent causes were retinal detachment, injury to the eye, and infections of the eye.

While surgery has proven to be of benefit in restoring vision to most people with cataract, it is expensive and may occasionally be complications. There is as yet no medical treatment to prevent loss of vision due to macular degeneration.

Laser treatment only helps a very small number of people who develop macular degeneration. Because of this, it is necessary to understand why some people develop these diseases, while others do not and to develop methods to prevent these diseases.

THIS INFORMATION is important because more people are expected to live longer. At present, there are 3.5 million people, or 1.4 percent of the United States population, who are 85 years of age or older. By 2020, it is expected that there will be 7.3 million people, or 3.5 percent of the population, who will be this age.

As a result, if the rates of these diseases continue unchanged, a larger number of people will have these diseases and be visually impaired. This creates additional social problems with considerable financial drain on families and institutions, because visually impaired people can no longer care for themselves.

In the series of articles to follow researchers will examine in more detail, cataract, age-related maculopathy, and glaucoma and their relation to a number of factors which may increase or decrease the risk of these conditions.

Next: What is cataract?
Age Related Cataracts

- Nuclear (nuclear sclerosis)
- Cortical
- Posterior Subcapsular
What have we learned about cataract from the Beaver Dam Eye Study?

• More than 80% of persons over 75 years of age have cataracts
• Women are more likely to be affected than men
• Smoking
• Heavy drinking
• Exposure to UV-B
• Diabetes
Possible Protective Factors
Clues from the Beaver Dam Eye Study

- Multivitamins
- Statin drugs
Why is preventing cataracts important?

• Cataract is
  – Leading cause of blindness worldwide
  – Leading cause of vision loss in the US
  – Responsible for 60% of all Medicare costs related to vision
• Cataract surgery
  – May be complicated and uncomfortable
  – Is expensive
  – May not be available to those with limited or no health care coverage
  – Is not widely available in third world countries
Other Insights

- Falls and fractures related to decreased vision
- Cataract is related to decreases in other functions including hearing
- Poor vision is associated with frailty
Why are these findings important?

• Some things that increase risk for eye diseases can be avoided (smoking, heavy drinking)
• Improved control of blood sugar for those with diabetes
• Vision can be improved for some with new glasses; may decrease risk of falls
• Genetic studies may identify genes whose effects can be modified by new medications
What’s next?

• Identify mechanisms of how decreased vision leads to falls
• Identify how risk of falls in those with impaired vision can be decreased
• Clinical trials to test whether improvement in vision, balance, and gait training will decrease risk of falls
• Identify new factors that may prevent cataract, macular degeneration and vision loss