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Diseases among the Navajo Indians*

Albert L. Muggia, MD, Albuquerque, New Mexico

Little is known about diseases among the Navajo Indians and few studies have been published, yet there are many differences from diseases in the rest of the United States. This paper is a review of the literature on some of the most striking aspects of Navajo diseases, adding personal experience and observations.

THE NAVAJO INDIANS are a closely knit group with a similar pattern of living, and they are almost all direct descendants from the estimated 7,000 Indians who survived "The Long March" and four years of imprisonment at Fort Sumner one hundred years ago.¹ The differences in disease prevalence can help us to think along new lines about the etiology of many disorders, may suggest new ideas for therapy, and help us understand the disease better.

There are 128,000 Navajos living in an area of 25,000 square miles comprising the four state area of New Mexico, Colorado, Utah and Arizona. Except for the few who work in the cities, they lead a rural life herding sheep, working with silver, weaving rugs, or painting.

Many problems are encountered in providing the Indians with good medical care, the most formidable one being transportation. The Public Health Service has excellent facilities with doctors and hospitals, but the Indian must get to the hospital before he can obtain this care. The roads are impassable whenever it rains or whenever the snow melts, and many Indians do not have cars; to have to pay someone else for a ride can present quite a problem. A lesser problem is that almost all the physicians who care for

these Indians are fulfilling their draft requirement (United States Public Health Service) and do not stay in the area long enough to get to know and understand the Indians and their difficulties. In addition, the language and cultural barrier often leads to inadequate histories, explanations, and physician empathy.

The Indian believes that disease is caused mostly by "disharmony with the environment."² They often will not accept the physician's explanation of diseases because they do not understand them. To the Navajo patient diseases do not come from viruses or bacteria but from a multiplicity of other causes:

1. Infections from enemies or from animals. This can be acquired by hunting the animal, eating it, mishandling it, or seeing it; bears, especially, are animals that can cause illness.
2. Evil spirits of those who have died.
3. Natural phenomena, such as wind or lightning.
4. Witchcraft.
5. From improper behavior or neglect at ceremonies.² Navajo medicine men try to detect the cause of diseases by hand trembling, star gazing, or staring in a ritual fashion.² When a family is told that a patient has been "witched," they know that nothing can be done and that the end is inevitable. They are not afraid of death, and theirs is one of the few religions that does not include expectations of a life after death. Many patients come to the Anglo doctor only for symptomatic relief until they can afford to undergo the proper ceremonial which restores body harmony.

The Navajos have specific medicines for specific symptoms, but these are not necessarily taken by mouth. It may be enough to rub them on the stomach or put them in the

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room.² Few toxic chemicals are used. The only medical problem has been encountered with medicine men of the Native American Church who use peyote³ and some times also other drugs. We have seen acute liver toxicity, hepatorenal syndrome, or acute enteritides following medications administered by the medicine man. The nature of the chemical used could not be determined.

The ceremonies or sings are of many types. They all guarantee cure. Because of this at least one-fourth of our patients will interrupt hospitalization for a sing and one-third will admit to a sing before admission.²

The Indian in general appears to us as very stoic and non-complaining. It is difficult to determine what sort of things bother him and what things do not. It is clear that he does not like to be rushed into a decision at any time. The Navajos are extremely patient. They will wait for hours without demonstrating any restlessness or irritability. He is not prone to say thank you or please. Patients often will not look directly at the examiner during history taking, and this may often be improperly interpreted as indifference and hostility. Patients will not let the physician know if they are unhappy; they will merely leave.

Non-Indians will often blame their illnesses, ailments and malaise on something they ate; the Navajo will almost always blame it on pushing a car, being kicked by a horse, or falling off a horse.

In general, the medicine man has a good idea of who is sick and who is not. Patients are referred to "the white doctor" saying that the medicine man told them they had a "blood clot in their head," and they indeed have a subdural hematoma. Sometimes the medicine man may refer a patient saying that he removed one gallstone but could not remove the other two. The medicine man will also send to the "Anglo" doctor extremely neurotic women that he has been unable to help. On the other hand, he may tell a man with incurable cancer that he need not come for conventional medical care because we can do nothing for him. He may also tell a patient with a coin lesion in his lung not to come back into the hospital because as a medicine man he knows that it

is a tuberculoma whereas the doctor will worry about cancer.

Anxiety over procedures or illness seems to be absent among the Navajos. They are very fatalistic in their approach to things. Endoscopy in Navajos is extremely easy and sedation or local anesthesia is not required.

Suicides are supposedly common among Navajos. In general, among American Indians the suicide rate is 1.6 times that of non-Indians. In 1967 there were 17 Indian suicides per 100,000 population compared to 10.8 per 100,000 population in non-Indians. Among the Indians, 83 per cent of the suicides occurred in males, whereas in the rest of the United States 74 per cent of suicides were male. The most interesting aspect of Indian suicides is that a striking peak occurs between the ages of 15 and 20, whereas in the United States as a whole there is a gradually increasing curve with most of the suicides being in the older age group. Possibly the young Indian is caught in a cross cultural conflict, whereas the older Indian has made peace with it. Many factors contribute to the high suicide rate including alcohol, poverty, dropping out of school, and trouble with the law.⁴

Appearance. Like most other Athabascan tribes the Navajos practically never become bald. They have no hair on their chest or on the sides of the face. Characteristically, a Navajo never shaves. This undoubtedly is a genetic characteristic.

Congenital Malformations do occur among Navajos. No figures are available for Navajos only, but including other tribes the total malformation frequency was found to be 1.86 per cent of all births versus 1.58 per cent in Caucasians and 2.44 per cent in Negroes.⁵

Congenital hip dysplasia, club foot and polydactyly are commonly seen.⁵ The prevalence of Albinism is that of 1 in 3,750.⁶ Harelip and cleft palate are twice as common in Navajos as in the Caucasian population with an incidence of 1 in 400. Cleft uvulas are 10 times as common in the Navajos as in the Caucasian population and are found in 11 per cent of Navajo Indians.⁷

Blood Types. Eighty-three per cent of Navajos are Type O, and the remainder are Type A. In the United States there is a 45 per

cent incidence of Type O. Almost all Navajos are Rh positive, with only a six per thousand incidence of Rh negative blood against 15 per cent in the United States.⁸ No hemoglobinopathies have been noted. Albumin Naskapi has been reported in 0.063 of Navajos.⁹ Methemoglobinemia is strikingly common, with many families having this characteristic. Several families have been found with methemoglobinemia in all members suggesting unusual penetrance or homozygosity of this usually recessive gene. In the few cases studied a deficiency of DPNH diaphorase in the red cell was found, and all the cases had no symptoms and were in good health.¹⁰ Hemophilia has been seen in many of the Public Health Service Hospitals.

Blood or kidney donations are difficult to obtain. The argument that the donation is essential to save a life always gets a refusal, not because the Navajo is insensitive, but because they believe that if they give their blood to a man who dies they will also die. This is an idea that must be slowly overcome if we expect the number of blood donations to increase. Many Indians also do not like to receive blood because of fear of evil spirits.

Infant Mortality in the Navajo area has been much higher than that of the rest of the United States. The infant death rate in 1962 was 59.4 per 1,000 live births versus 25.3 in the non-Indian population.¹¹ However, by 1968 the Indian mortality was down to 30.6 per 1,000 live births. Part of this high infant mortality is related to infections and gastroenteritides, but parental alcoholism also plays a role. In addition, the high infant mortality may be related to the fact that Navajo women have little prenatal care. Forty-seven per cent have no prenatal care at all, 23 per cent are seen in the third trimester for the first time, and only 13 per cent are seen in the first trimester.¹² Pregnancy is considered the natural course for all women, and not an illness.

Alcoholism has been for many years the largest problem facing the reservation and probably the highest single cause of mortality.¹³ Alcohol related automobile and horse accidents are common. Accidents account for 16 per cent of all deaths compared

to five per cent in the United States as a whole.¹⁴ The high prevalence of alcoholism is in part due to the high rate of unemployment, but many other factors play a role.

The treatment of alcoholism with Antabuse yields better results among Indians than it does in non-Indian populations. Many of them feel that this drug has magic powers and they also strongly insist on having a "wine test" while they are on Antabuse. Possibly, this is considered punishment they have to go through before their alcoholism can be cured. Certainly the one single measure that seems to have helped more than others is finding a job for the patient.

Gastrointestinal Diseases

Gallbladder Disease. "The Navajo burden"¹⁵ is biliary disease. There are many studies to show that gallbladder disease is frequent and very virulent. This is true in all the Indian tribes even though their diets are very different.^{15,16,17} Gallstone ileus, fistula, abscesses and biliary tree cancer are common in the Navajo, so that the presence of a gallstone is an indication for surgery in this group. We have seen gallstones in a 10-year-old girl, and carcinoma of the gallbladder in an 11-year-old patient.

The cause for this high incidence is unclear. A recent study demonstrated supersaturated bile in the hepatic duct postulating that some derangement of liver metabolism may exist in these patients.¹⁸ At the Gallup Indian Medical Center (GIMC), an active 200 bed hospital with 940 operations per year, biliary surgery represents 26.3 per cent of all major operations. The patients ranged in age from 17 to 104. About 80 per cent of the gallstone and the common duct stone patients were females.^{16,17}

Navajo women will present with gallstones 15 years earlier than their non-Indian counterpart; this difference is not found in males. Biliary fistulas are seen more often, common duct stones will occur earlier, and carcinoma, although it occurs at the same time as in non-Indians or even later, has a definitely higher incidence and occurs in women four times more often than in males^{16,17,19,20} (Table 1). Cholelithiasis is found in 24.4 per cent of all autopsies as against only 9.1 per cent of United States autopsies.¹⁴

TABLE 1 16, 17, 19, 20, 21

Age and Complications of Biliary Tract Disorders		
	Gallstones	Carcinoma
	Navajo	Navajo
Average Age at Diagnosis:	Male 56-65	67
.....	Female 30-40	63
Common Duct Stones		
Average Age at Diagnosis:	Navajo	Non-Indians
.....	46	57.8
Complications Encountered in Cholecystectomies		
	Navajo	Non-Indians
Biliary Fistula for Benign Disease	5 %	0.2%
Common Duct Stones	18.5%	10.4%
Carcinoma	3-5 %	0.5%

Duodenal Ulcers are seldom seen among the Navajos as well as among the other Southwestern tribes. During a six year period of observation no duodenal ulcers were observed in the Many Farms area.²² We saw one case over a two year period in Gallup, covering 10,000 hospital admissions.

Gastric ulcers, on the other hand, are common and are often associated with a superficial gastritis. Many of these patients with gastric ulcers had a high Basal and Maximal Acid Output in our experience. It almost seems that the Navajo with increased gastric secretion will get a gastric ulcer and not a duodenal ulcer.

The only study of gastric secretion in Indians that has been published reported that 21.8 per cent of Athabascan males had achlorhydria, compared with 14.6 per cent of Caucasians and 17.1 per cent of Negroes. In women the incidence of achlorhydria was slightly higher, 22.5 per cent.²³

Upper Gastrointestinal Bleeding. Because of the absence of duodenal ulcers, the major causes of bleeding are esophageal varices, gastric ulcer and gastritis (Table 2), and therefore a trial of milk and antacids is not warranted. History rarely helps in pinpointing the source of bleeding and the physical examination is often not helpful because palmar erythema and spider angiomas are rarely observed. X-ray studies produced a diagnosis in only 10 per cent of these patients. BSP excretion and direct endoscopy have proved to be the most helpful procedures. If endoscopy is not available, a therapeutic trial with pituitrin or with the Blakemore tube should be considered since esophageal varices are a more likely diagnosis than duodenal ulcer.

Pancreatitis. Despite the high incidence of alcoholism and cholelithiasis, pancreatitis is extremely rare in all the hospitals that treat Navajos. In an active 200 bed hospital (GIMC) with 5,000 admissions yearly, we saw only two cases of pancreatitis in one year. This is amazing considering that three to five patients with cholecystitis were seen every day and considering the large amount of heavy alcoholism treated. Could it be that they have separate channels for pancreatic and biliary secretions more often than non-Indians? This needs to be studied. Most Indians are binge drinkers and perhaps prolonged daily alcohol ingestion is necessary to produce pancreatitis. However, at surgery for gallbladder disease, pancreatitis is also rarely noted.

Ulcerative Colitis and Regional Enteritis were encountered at GIMC (Table 3). However, salmonella was cultured from four of 10 ulcerative colitis patients seen during a two year period raising the possibility that

TABLE 2

Summary of all Patients with Upper Gastrointestinal bleeding Admitted to GIMC in 1969.

(Total No. 50 Patients)

Diagnosis	Percent
Esophageal Varices	38%
Esophageal Ulcer	2%
Esophagitis or Mallory-Weiss Syndrome	14%
Total Esophagus	54%
Stress Gastric Ulcer	4%
Hemorrhagic Gastritis	24%
Gastric Ulcer	16%
Total Stomach	44%
Duodenal Ulcer	2%
Total Duodenum	2%

these were cases of salmonella ulcerative colitis. We have not seen any cases of severe ulcerative colitis. No patient required surgery or long term steroids. No serious extracolonic manifestations were seen. Most of the patients with ulcerative colitis responded well to conservative therapy. The usual psychiatric factors of other populations with ulcerative colitis were not found.

Diverticulitis and Diverticulosis are extremely rare in the Navajos, even in the older age group. Clinical disease related to diverticula is seldom encountered, possibly because constipation is rarely seen in the Navajo.

The Navajo diet is frequently high in corn, beans and tomatoes, and therefore they do eat a fair amount of roughage. Navajos do not drink milk as a rule, but they have not been studied for lactase deficiency, and their distaste for milk may just be on a cultural basis.

Cirrhosis was seen often at the GIMC. The high prevalence of alcoholism and the low nutritional value of their food contributed to this. Most of the cirrhosis seems to be found in the vicinity of Gallup, Shiprock, and Winslow where alcohol is available. The rural Navajo who lives in the middle of the reservation has a lower prevalence of cirrhosis.¹³ Only a solution to the basic factors involved in alcoholism will help solve this problem. An autopsy study of Southwestern Indians showed cirrhosis in 14 per cent of autopsies, compared to four per cent in non-Indians.²⁵

Carcinoma

It is interesting that most initial reports of Navajo tumors demonstrated a lower incidence of carcinoma than among non-Indian people. Hesse reported in 1964 that only 4.8 per cent of all deaths in Navajos were from cancer versus 15.7 per cent in the United

States as a whole.¹⁴ However, as time has gone by more and more cases of tumors have been reported in all the Indian tribes. An autopsy study at the Phoenix Public Health Hospital in 1967 demonstrated that neoplasms represent 17 per cent of autopsies as against 16.2 per cent in non-Indians. The same incidence as in non-Indians was found in lymphatic tumors and breast cancer. The author noted an increased incidence of carcinoma of the ovaries, liver, kidneys, prostate and gallbladder, and a decreased incidence of cancer of the uterus, stomach, lung and pancreas.²⁵

Carcinoma of the Cervix. One would expect a higher incidence of carcinoma of the cervix in Navajo women because of promiscuity, early coitus, poor hygiene and lack of circumcision. However, Jordan et al., in 1965 reviewed 35,259 Navajo women over the age of 15 and found that 3.3 out of 1,000 Indian women examined had carcinoma-in-situ compared with 7.9 for non-Indians.²⁶ Salsbury et al., performed Papanicolaou smears on 1,092 Navajos over the age of 22 finding only one carcinoma,⁸ whereas most general studies in the United States indicate a 1.8 per cent incidence of carcinoma. Bivens and Fleetwood in a large review study found 3.53 carcinomas of the cervix per 1,000 Indian women, compared to 4.25 per 1,000 non-Indian women in the same geographical area and during the same 10 year period. More carcinoma-in-situ was found in the past few years, when compared with invasive carcinoma. This is evidence that more Papanicolaou smears are being done and that the tumors are being found earlier.²⁷ Thus, carcinoma of the cervix appears to have an equal or somewhat lower incidence in Navajo women than in non-Indians.

Gastrointestinal Cancer

Carcinoma of the Colon. Colonic carcinoma represents 45 per cent of gastrointestinal tumors in non-Indians,²⁸ whereas it comprises only 14 per cent in Navajos. Could this be related to the absence of diverticulitis and diverticulosis or to the absence of constipation? Many factors have been studied, but there is little evidence to allow us to blame carcinoma of the colon on any

TABLE 3²⁴

Annual First Hospitalization Rates Per 100,000 Population.

	Ulcerative Colitis	Regional Enteritis
England	6.5	0.8
Norway	2.0	0.25
Baltimore (non-white)	0.45	0.04
Baltimore (white)	3.5	1.35
Navajos	5	0.5

particular etiologic factor other than genetic predisposition. There is no proof that diverticula predispose to the development of carcinoma, although frequently the two conditions co-exist.²⁹ Carcinoma of the colon is also rare in many African tribes who are also on a high roughage diet and this may be a factor.

Carcinoma of the Gallbladder represents six per cent of gastrointestinal tumors in non-Indians²⁸ as contrasted to 41 per cent in Navajos studied at the GIMC³⁰ from 1968 to 1970. Carcinoma of the gallbladder was seen in an 11-year-old girl. Here again one wonders whether nutritional factors might play a role in gallbladder cancer, but it is puzzling that all the Indian tribes with their different diets still show a high prevalence of biliary carcinoma.²⁵ Approximately five per cent of cholecystectomies in Navajos uncover a carcinoma,^{16,17,30} and 3.6 per cent of all autopsies had a carcinoma of the gallbladder versus 0.32 per cent in the United States.¹⁴

Cancer of the Pancreas and Esophagus show about the same incidence in Navajos as in the rest of the United States.

Carcinoma of the Stomach. Early reports seemed to indicate that there was less carcinoma of the stomach among Navajos,^{14,25} but either the incidence has increased or such patients seek medical attention more often. At the GIMC they represent 26 per cent of the gastrointestinal tumors as against 20 per cent in non-Indian populations.²⁸ This is consistent with the increased incidence of achlorhydria.²³ While the incidence of carcinoma of the stomach in the United States has dropped,³¹ it has increased in the Navajo nation. Many factors may play a role in this. Carcinoma of the stomach has appeared to be a disease of poor people on high carbohydrate and low fruit and vegetable diets,³¹ with early loss of teeth.³² It also appears to parallel the incidence of gastric ulcers and to have an inverse relationship to the incidence of carcinoma of the colon.^{31,32} All of these factors occur in the Navajo nation.

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TABLE 4
Percent of Gastrointestinal Cancers

	Non-Indians (28)	Navajos (30)
Stomach	20	26
Colon	45	14
Biliary	6	49
Pancreas	17	5
Small Bowel	2.4	1
Liver	4	5

In addition, cancer of the stomach is common in Japan and China; the Navajo's Athabaskan ancestors apparently came from that area (Table 4).

Carcinoma of the Lung, Larynx, and Bladder are almost unheard of, possibly because Navajos do not smoke.

Lymphomas occur in Navajos in the same frequency as in the United States as a whole. However, in Navajos Hodgkins Disease represents 20 per cent of the lymphomas, whereas in non-Indian populations it accounts for 60 per cent of cases. This difference could be just from genetic susceptibility. Chronic myelogenous leukemia is seen often in adults, whereas chronic lymphocytic leukemia is not seen. It is interesting that chronic lymphocytic leukemia is also rare in Japan.³³

Nasopharynx and Sinus carcinomas are seen frequently, though no accurate figures are available. It is our impression that they are more frequent than in other areas. This could be related to the extremely dry environment in which the Navajos live. The Chinese and the people of Southeast Asia also have this tumor in high frequency.³²

Neurological Diseases. Pathologists are always impressed by the lack of cerebral vascular arteriosclerosis noted in Navajos at autopsies. Whenever the clinical picture of a cerebral vascular accident is encountered, trauma, subdural hematoma, tuberculosis or a tumor must be considered. Most of the cerebral vascular accidents seen have been in diabetics.

Multiple sclerosis, amyotrophic lateral sclerosis and other demyelinating diseases are seen. Parkinson's is also encountered. Peripheral neuropathies secondary to trauma, ethanol or diabetes are frequently encountered and are a source of considerable disability.

Of interest, only one per cent to two per

cent of Navajos having skull x-rays at GIMC showed pineal calcification.

Infectious Diseases

Tuberculosis is probably the most widespread infectious problem in the Navajo Reservation. Eight and three-tenths per cent of autopsies, including other Southwestern Indians, were found to show active tuberculosis.²⁵ Hesse found tuberculosis to be responsible for five per cent of deaths in Navajos compared to 0.7 per cent in all races.¹⁴ Tuberculosis can present in many different forms and should be considered the working diagnosis when a pulmonary coin lesion is present. Pleural effusion, weight loss, fever of unknown origin, a deterioration in a cirrhotic, brain tumors, strokes, hematuria, hemoptysis and adenopathy—all these things which are often associated with other illnesses elsewhere make us think of tuberculosis first when we are dealing with a Navajo. We have had several cases where carcinoma of the stomach was seen by upper gastrointestinal series and the apparent Virchow nodes were presumed to be metastatic until a biopsy showed them to be tuberculous.

The enteric diseases: salmonella, shigella and virus enteritides are frequent. In the Navajo area an attack rate of 297 cases of shigella per 100,000 population has been reported, whereas the entire United States including Indians reported 4.6 cases per 100,000 population. Forty-four per cent of the cases are in the age group of 1 to 4 years with a peak in July, August and September.³⁴ Salmonellosis is also a frequent problem. One to two cases of tularemia and bubonic plague are seen every year.

We often see subacute bacterial endocarditis because of the high incidence of rheumatic heart disease and poor dental care.³⁵

Syphilis, gonorrhea, and lymphogranuloma venereum are common. Thirteen per cent of the people seen at the GIMC had a positive serology. This may be related to the alcohol problem. At the GIMC, 30 to 60 cases of gonorrhea are diagnosed every month, and these represent only 25 per cent of the area total.³⁶ This adds up to 200 new cases every month for a population of 100,000.

Tetanus has not been reported in spite of the large number of severe and unattended wounds which become infected. Possibly the

dryness of the environment does not allow *Clostridia* to survive. Many Navajos have had tetanus toxoid, but one would doubt that this is the only cause for the lack of tetanus.

Sarcoid is another disease that has not been diagnosed in Navajos.

Navajo Arthritis

Navajos do not have gout. Rheumatoid arthritis and osteoarthritis are present in the usual incidence. A new entity which could be called "Navajo Arthritis" has been encountered. It is an acute, self-limited polyarthritis most often affecting the knee but may also involve other joints. All these patients have negative tests for rheumatoid factors, LE cells and negative cultures. They recover completely without antibiotics after a two to three week interval. This may represent a mild form of rheumatoid arthritis without positive tests for rheumatoid factor or a peculiar mild form of hypersensitivity to the gonococcus without actual joint infection.³⁷

Heart Disease

Heart disease is responsible for 5.9 per cent of all deaths versus 38.7 per cent in the other races of the United States.¹⁴ The streptococcus is endemic at all times and high ASO TITERS are seen often.³⁵ Most school youngsters have ASO TITERS over 250, and rheumatic fever and rheumatic heart disease are common. Congestive heart failure secondary to a myocardopathy of unknown etiology is often found. A search for amyloid, hemochromatosis and other etiologies is usually fruitless.³⁸ It is interesting that in our experience most of these patients were alcoholics, whereas Brandfonbrener et al., report that only two of their patients were alcoholics.³⁸

In contrast, atherosclerosis and coronary

disease are rare. Only 14 per cent of Navajos over 20 had atherosclerosis of the aorta at autopsy, compared to 37 per cent at the Mayo Clinic.¹⁴ Gilbert studied 10,267 consecutive admissions to the Fort Defiance Hospital and found no recorded admissions for coronary disease as compared to 125 admissions for cholecystitis. He compared this with a similar number of admissions to St. Joseph Hospital in Albuquerque, a hospital of the same size, where primarily non-Indians are treated. There were 146 coronary thromboses admitted over a four year period.³⁹ These differences are probably not due to dietary factors.

The Navajo diet has been well studied and has been found to be adequate in calories and very high in animal fats. Some Navajo wells contain hard water, but this is very variable and most Indians use water from many different wells.^{22,39,40}

Later studies show that coronary disease does occur, but only in one-fourth to one-tenth the incidence of non-Indians. In a study of 4,741 records of Navajos over the age of 30 compared with 1,478 white patients at Bataan Hospital in Albuquerque as controls, data was obtained showing that 86 per cent have a normal electrocardiogram and that 78 per cent of Navajos have no atherosclerosis at autopsy.⁴¹ (Table 5).

The incidence of coronary disease in Navajos has been compared to the Framingham Study and is definitely much lower. Eight out of 1,000 Navajos in Many Farms had coronary heart disease as against 32.9 out of 1,000 Anglos in Framingham.¹⁴ Also blood pressure, serum cholesterol and the incidence of all ECG abnormalities including left ventricular hypertrophy is below Framingham expected figures.²²

TABLE 5⁴¹
Electrocardiographic Findings

	Navajo	Bataan Hospital
Acute Myocardial Infarction	0.9%	9.2%
Old Myocardial Infarction	1.8%	3.5%
Normal	86.1%	55.7%
Non-specific changes make up the rest.		

Autopsy

Degree of Atherosclerosis	Navajo	Bataan Hospital
None	78 %	18 %
Minimal	14.6%	11.6%
Moderate	2.4%	32.6%

Practically speaking, coronary disease is unusual. One-hundred-year-old people with perfectly normal cardiograms are often seen and the elderly Navajos tolerate surgery with a remarkable paucity of cardiac complications. However, the incidence may be increasing since coronary occlusions in diabetic Navajos are now being documented more often.

Endocrine

Thyroid. Thyroid disease has been well studied in Navajo Indians. PBI's are generally normal,²² though both thyrotoxicosis and hypothyroidism have been recorded. Goiters are common, though many of them are asymptomatic. Thyroiditis and neoplasms of the thyroid are also seen.

Cholesterol levels in Navajos have been found to be somewhat lower than in non-Indian populations. The average is 190 mg per cent. There is also a lack of increasing cholesterol with aging and obesity.⁴⁰ Hyperlipemia has been documented in Navajos, although the exact frequency is unknown.

Obesity occurs in Navajos less frequently than in non-Indians with only 10 per cent being considered obese against 30 per cent in the general United States population.²²

Sheehan's syndrome occurs with amazing frequency among the Navajos and is probably related to the high incidence of obstetrical complications. On the average 8 to 10 cases a year are seen at the GIMC. Prevalence figures are not available.

Addison's disease is also frequently encountered; this may be related to the high incidence of tuberculosis.

Diabetes Mellitus. Diabetes is not uncommon among the Navajo and has a prevalence of 0.9 per cent of the general population and 2.3 per cent of those over the age of 40. It is striking that juvenile diabetes is not seen and the youngest reported has been 20 years of age.⁴² The acute complication of ketoacidotic coma is rare, though ketoacidosis is not uncommon. The chronic manifestations of retinopathy and peripheral vascular disease (coronary arteriosclerosis and gangrene) are uncommon.^{42,43} This is in striking contrast to the 37 per cent of patients at the New England Deaconess Hospital having coronary artery disease, 16 per cent having

peripheral vascular disease, and 38 per cent having diabetic retinopathy.⁴⁴

Plasma glucose and insulin studies have revealed that the significantly reduced carbohydrate tolerance is secondary to insulinopenia.⁴⁵

Because of their socio-cultural characteristic and their vast, poorly accessible reservation, the management of diabetes in the Navajos poses special problems. Their dietary habits and the limited accessibility to a variety of foods make it almost impossible to follow a diabetic diet. Oral hypoglycemic agents are given preference to insulin because of a reluctance of the Navajos to give themselves injections, and more importantly high temperatures inactivate insulin and there is a lack of refrigeration facilities. Despite these limitations diabetes remains mild and tolerance to blood sugars of 600 mg per cent for long periods, without complications, is common.

Pulmonary Disease

Emphysema by itself is not common, except as a result of far advanced tuberculosis. This is mostly seen in the older Navajos who grew up before streptomycin. The younger patients who do not smoke and whose tuberculosis is adequately treated do not get emphysema.

Asthma and chronic obstructive pulmonary diseases are extremely rare. Bronchiectasis, on the other hand, is common and is the result of recurrent pneumonias in childhood or adulthood that have not been properly treated and often present a difficult therapeutic problem. Lobar pneumonia, especially pneumococcal, is a cause of great mortality and disability in the winter months.

Ears

Acute and chronic otitis media is a major problem on the reservation. Four per cent of high school students were found to have perforated drums. Congenital aural atresia occurs in 2.5 cases per 3,000 births per year. Acoustic neuromas and Menieres have never been reported. Hereditary and congenital deafness also have never been reported. There are only three cases of documented otosclerosis.⁴⁶

Eyes

Trachoma is still endemic among the Navajos.⁴⁷ (Table 6). As a result of the four per cent to 10 per cent prevalence of active trachoma, there is also a serious problem with the scarring of Grade four trachoma. An active campaign of trachoma control is being conducted and the prevalence can be expected to decrease fairly rapidly.

Pterygia are common probably as a result of the exposure to solar radiation.

A high degree of astigmatism in children has been noted, and this is probably inherited. There is a lower incidence of primary open

TABLE 6⁴⁷
Trachoma Among the Navajo Indians

Age	Active	Inactive
6- 9	4 %	0.6%
10-13	6.3%	3.8%
14-19	9.7%	7.2%
Over 20	6.7%	46.5%

angle glaucoma and of diabetic retinopathy than in the general population. Probably the most serious eye problems are those secondary to trauma; hyphemas and perforating wounds are frequently encountered.

Conclusion

An attempt has been made to review information concerning illness among the Navajo Indians from the literature and our own experience at the GIMC in an effort to outline basic differences from the rest of the United States.

Many of these differences could be strictly hereditary, some could just be a reflection of their way of life.

The lack of carcinoma of the lung and of chronic pulmonary disease helps us reinforce

the dangers of smoking. The lack of duodenal ulcers and coronary disease suggests again their relationship to chronic and acute anxiety. The rarity of carcinoma of the colon and diverticulosis might make us wonder if dietary factors and chronic constipation could play a role in these ailments. The lack of pancreatitis needs more exploration, but could possibly be used to prove or disprove a common channel theory for pancreatitis. The high incidence of streptococcal diseases in this area³⁵ lends itself to various epidemiologic studies and to the trial of new methods for the elimination of this organism. The new entities of Navajo arthritis³⁶ and Navajo diabetes⁴² are interesting and deserve further study. The high incidence of cholelithiasis and carcinoma of the gallbladder requires further study. Understanding of metabolic defects present in this population may help us define the etiology of this disease.¹⁸ The high incidence of shigellosis, tuberculosis and alcoholism are the tragic aspects of Navajo life and represent ongoing problems for the Public Health Service.

It will be interesting in retrospect 20 years from now to examine how many of these differences will have disappeared as the Navajo life style becomes anglicized, and as the natural selection engendered by their high infant mortality becomes less prominent.

Continued documentation is necessary to elucidate many of the differences covered here; it is hoped that this paper is a start in that direction. •

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REFERENCES

- 1 Underhill, R. M.: The Navajos, University of Oklahoma Press, 1956, p. 146.
- 2 Porvaznik, J.: Traditional Navajo Medicine. *General Practitioner*, 36:179-182, 1967.
- 3 Underhill, R. M.: The Navajos. University of Oklahoma Press, 1956, p. 248.
- 4 Ogden, M., Spector, M., and Hill, C.: Suicides and Homicides Among Indians. *Public Health Report*, 85:75-80, 1970.
- 5 Adams, M. S., and Niswander, J. D.: Health of the American Indian—Congenital Defects. *Eugenics Quarterly*, 15:227-234, 1968.
- 6 Woolf, C. M.: Albinism Among Indians in Arizona and New Mexico. *American Journal of Human Genetics*, 17:23-35, 1965.
- 7 Jaffe, B. F., and DeBlanc, B. G.: Cleft Palate, Cleft Lip and Cleft Uvula in Navajo Indians. *The Cleft Palate Journal*, 7:300-305, 1970.
- 8 Salsbury, C. G., Howard, F. H., Bassford, P. S., Atkinson, G. P., and Green, R. W.: A Cancer Detection Survey of Carcinoma of the Lung and Female Pelvis Among Navajos on the Navajo Indian Reservation. *Surgery, Gynecology and Obstetrics*, 108:257-266, 1959.
- 9 Melartin, L., and Blumberg, B. S.: Albumin Polymorphism (Albumin Naskapi) in Eskimos and Navajos. *Nature*, 218:787-789, 1968.
- 10 Balsamo, P. A., Hardy, W. R., and Scott, E.M.: Hereditary Methemoglobinemia Due to Diaphorase Deficiency in Navajo Indians. *Journal of Pediatrics*, 65:928-930, 1964.
- 11 Findley, D.: Some Health Problems of the Navajo Indians. *Nebraska Medical Journal*, 49:326-332, 1964.
- 12 Loughlin, B. W.: Pregnancy in the Navajo Culture. *Nurses Outlook*, 13:55-58, 1965.
- 13 Kunitz, S. J., Levy, J. E., and Everett, M.: Cirrhosis Among the Navajo. *Quarterly Journal of Studies on Alcohol*, 30:672-685, 1969.
- 14 Hesse, F. G.: Incidence of Disease in the Navajo Indians. *Archives of Pathology*, 77:553-557, 1964.
- 15 Sievers, M. L., and Marquis, J. R.: The Southwestern American Indian's Burden: Biliary Disease. *Journal of the American Medical Association*, 182:570-572, 1962.
- 16 Sampliner, J. E., and O'Connell, D.: Biliary Surgery in the Southwestern American Indian. *Archives of Surgery*, 96:1-3, 1968.
- 17 Brown, J. E., and Christensen, C.: Biliary Tract Disease Among Navajos. *Journal of the American Medical Association*, 202:1050-1052, 1969.
- 18 Small, D. M., and Rapo, S.: Source of Abnormal Bile in Patients with Cholesterol Gallstones. *New England Journal of Medicine*, 283:53-57, 1970.
- 19 Colcock, B. P., and Perey, B.: The Treatment of Cholelithiasis. *Surgery, Gynecology and Obstetrics*, 117:529-534, 1963.
- 20 Smith, R. F., Conklin, E. F., and Porter, E. R.: A Five Year Study of Choledocholithiasis. *Surgery, Gynecology and Obstetrics*, 116:731-740, 1963.
- 21 Amoury, R., and Barker, H. G.: Multiple Biliary Enteric Fistulas. *American Journal of Surgery*, 111:180-185, 1966.
- 22 Fulmer, H. S., and Roberts, R. H.: Coronary Heart Disease Among the Navajo Indians. *Annals of Internal Medicine*, 59:740-764, 1963.
- 23 Sievers, M. L.: A Study of Achlorhydria Among Southwestern American Indians. *American Journal of Gastroenterology*, 45:99-108, 1966.
- 24 Mendeloff, A. I., Monk, M., Siegel, C. I., and Lilienfeld, A.: Some Epidemiological Features of Ulcerative Colitis and Regional Enteritis. *Gastroenterology*, 51:748-756, 1966.
- 25 Reichenbach, D. D.: Autopsy Incidence of Diseases Among Southwestern American Indians. *Archives of Pathology (Chicago)*, 84:81-86, 1967.
- 26 Jordan, S. W., Munsick, R. A., and Stone, R. S.: Carcinoma of the Cervix in American Indian Women. *Cancer*, 23:1227-1232, 1969.
- 27 Bivens, M. D., and Fleetwood, H. O.: A 10 Year Survey of Cervical Carcinoma in Indians of the Southwest. *Obstetrics and Gynecology*, 32:11-16, 1968.
- 28 The National Health Education Committee, Inc.: Facts on the Major Killing and Crippling Diseases in the United States Today; *Cancer*, p. 4, 1964.
- 29 Ackerman, L. V., and del Regato, J. A.: *Cancer*. C. V. Mosby Company, St. Louis, Missouri, 1962, p. 649.
- 30 Rudolph, R., Cohen, J. J., and Gascoigne, R. H.: Biliary Cancer Among Southwestern American Indians. *Arizona Medicine*, 27:10:1-4, 1970.
- 31 Raven, R. W., and Roe, F. J. C.: *The Prevention of Cancer*. Appleton Century Crofts, 1967, pp. 100-101.
- 32 Shivas, A. A.: Racial and Geographical Factors in Tumor Incidence. *Edinburgh University Press*, 1967, pp. 47-51, 185.
- 33 Finch, S. C., Hoshino, T., Itoga, T., Ichimaur, M., and Ingram, R. H.: Chronic Lymphocytic Leukemia in Hiroshima and Nagasaki. *Blood*, 33:79-86, 1969.
- 34 Reeler, L. B., and Spector, M. I.: Shigellosis Among Indians. *Journal of Infectious Diseases*, 121:355-357, 1970.
- 35 Perlman, L. V., Herdman, R. C., Kleinman, H., and Vernier, R. L.: Poststreptococcal Glomerulonephritis. *Journal of the American Medical Association*, 194:63-70, 1965.
- 36 Outpatient Morbidity Reports, Indian Health Service USPHS Hospital, Gallup, New Mexico. May 1969—March 1970.
- 37 Muggia, A. L., Bennahum, D., and Williams, R. C.: Navajo Arthritis—An Unusual, Acute, Self Limiting Disease. (To be Published in *Arthritis and Rheumatism*).
- 38 Brandfonbrener, M., Lovekin, W. S., and Leach, J. K.: Cardiomyopathy in the Southwest American Indian. *British Heart Journal*, 32:491-496, 1970.
- 39 Gilbert, J.: Absence of Coronary Thrombosis in Navajo Indians. *California Medicine*, 82:114-115, 1955.
- 40 Sievers, M. L.: Serum Cholesterol Levels in Southwestern American Indians. *Journal of Chronic Diseases*, 21:107-115, 1968-69.
- 41 Streeper, R. B., Massey, R. U., Liu, G., Dillingham, C. H., and Cushing, A.: An Electrocardiographic and Autopsy Study of Coronary Heart Disease in the Navajo. *Diseases of the Chest*, 38:305-312, 1960.
- 42 Saiki, J. H., and Rimoin, D. L.: Diabetes Mellitus Among the Navajo. I. Clinical Features. *Archives of Internal Medicine*, 122:1-5, 1968.
- 43 Prosnitz, L. R., and Mandell, G. L.: Diabetes Mellitus Among Navajo and Hopi Indians: The Lack of Vascular Complication. *American Journal of Medical Sciences*, 253:700-705, 1967.
- 44 Bryfogle, J. W., and Bradley, R. F.: The Vascular Complications of Diabetes Mellitus. *Diabetes*, 6:159-167, 1957.
- 45 Rimoin, D. L., and Saiki, J. H.: Diabetes Mellitus Among the Navajo. II. Plasma Glucose and Insulin Responses. *Archives of Internal Medicine*, 122:6-9, 1968.
- 46 Jaffe, B. F.: The Incidence of Ear Diseases in Navajo Indians. *Laryngoscope*, 79:2126-2133, 1969.
- 47 Lawler, D. J., Biswell, R., Sharvelle, D. J., and Carreno, O.: Trachoma Among the Navajo Indians. *Archives of Ophthalmology*, 83:187-190, 1970.