An Evaluation of Iridology

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Irirdology is an analysis of health based on examination of the iris of the eye. One hundred forty-three patients had photographs taken of both eyes. Ninety-five patients were free of kidney disease, defined as a creatinine level of less than 1.2 mg/dL (mean, 0.8 mg/dL), and 48 had kidney disease severe enough to raise the plasma creatinine level to 1.5 mg/dL or greater (mean, 6.5 mg/dL). Three ophthalmologists and three iridologists viewed the slides in a randomized sequence without knowledge of the number of patients in the two categories or any information about patient history. Iridology had no clinical or statistically significant ability to detect the presence of kidney disease. Iridology was neither selective nor specific, and the likelihood of correct detection was statistically no better than chance.

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THE EYE has long been an area of inquisitiveness for those in medicine. Compelled by an appetite for eye contact and the expressiveness rendered via the eye, diagnosticians have often looked to the eye for clues. Though unrecognized by most but not all Western medical physicians, a relationship is reported to exist between the appearance of the iris of the human eye and the functional status of various organs and anatomy of the body. The screening technique whereby one looks to the iris to discern the functional state of these areas is variously termed iridology, iris-analysis, and iris diagnosis, henceforth called iridology in this article. The technique has existed for approximately 100 years and counts physicians as proponents in its evolution, including its founder.

Signs of systemic disease in the iris are not new to Western medicine.1 In primary syphilis, reddish spots can be observed sometimes on the lesser circle of the iris. Disappearing within a few days, they are comparable to the macular lesions seen on the skin and are often present at the same time. As the syphilis progresses, one may see iris atrophy or iris papulosa (gummatous iritis), which is a true gumma—the tertiary lesion of syphilis.

Herpes zoster has been associated with a severe iritis, eventually ending in a hyperpigmentation and necrosis of the iris. In neurofibromatosis (von Recklinghausen's disease), one may find, among other ocular manifestations, areas of pigmentation that are sometimes incorrectly diagnosed as melanosis. Tuberculosis, diabetes mellitus, atherosclerosis, sarcoidosis, and rheumatic disorders (Reiter's syndrome, ulcerative colitis, Crohn's disease, juvenile rheumatoid arthritis, and ankylosing spondylitis) are among a few of the disorders and syndromes too numerous to mention with confirmed manifestations in the iris.

Yet iridology offers a different perspective. In a manner somewhat akin to the motor homunculus in the brain, the iris is sectioned into various areas, each representing a different organ structure in the body (Figure). Though lacking a uniform scientific explanation for how pathology in a distant corner of the body may come to be registered in the iris, iridologists yet maintain that the latter is true.

Though iridology has been much criticized,14 it has never been scientifically studied. As scientists, however, we need not reflect long to recognize the vulnerability of this practice. Ophthalmologists have been able to rely only on personal belief in responding to inquiries by their patients and the press. The words of an Indian scholar are appropriate: "The cosmos would be fairly chaotic if its laws could not operate without the sanction of human belief."
should take care lest its attitudes come to parallel that of the guard dog, that, only too aware of his boundaries, barks each time he senses an intruder.

The intent of the study was to determine whether practicing iridologists in southern California could demonstrate statistical significance (P<.05) in distinguishing normal and abnormal kidney function from 35-mm slides of the irides of patients. Ophthalmologists were also asked to participate and give their assessment. The kidney was selected on the basis of its relative utility: (1) The kidney area of the iris, lying just medial of the 6-o'clock position in each of the irides, was easy to photograph. (2) Kidney function is assessed on nearly all patients admitted to our hospitals via determination of plasma creatinine level. (3) Iridologists felt comfortable dealing with both 35-mm slides and the kidney area. In one iridologist's words, "a careful study of iris photographs . . . can ascertain . . . the condition of each organ in particular—eg, acute, subacute or chronic conditions of the liver, kidney, etc. . . .

SUBJECTS AND METHODS

We selected case-control (retrospective) research strategy as the most useful method to study the manifestations of kidney disease in the iris of the human eye.

Selection of Patients

The study population consisted of patients from either of two hospitals: the University of California Medical Center and the Veterans Administration Medical Center, both in San Diego. Patients were selected on the basis of renal dysfunction, ranging from near normal to that requiring hemodialysis (Table 1). Determination of kidney function was based on the patient's history in conjunction with the present plasma creatinine level, as ascertained by the alkaline picrate reaction on dialyzed specimens of serum. Doolan et al1 plotted plasma creatinine concentrations against clearance values. They found that if the plasma creatinine concentration is less than 1.25 mg/dL in men and less than 1.1 mg/dL in women, the clearance value will always be normal unless the patient has extensive muscle wasting. (This formed the basis for assigning patients to our control group, labeled group 1 in the study and Table 1.) Their data then showed a transition zone, where plasma creatinine concentrations from 1.75 to 5.5 mg/dL in men and 1.4 to 5.5 mg/dL in women were associated with clearance values ranging from slightly subnormal down to 20 mL/min. Patients with plasma creatinine levels in this range were assigned to group 2 in our study, those patients with moderate kidney dysfunction. The third group reflected a wide variability in plasma concentrations, from 6 mg/dL to extreme values in some patients with uremia in whom clearance values were 20 mL/min or less.

Seventeen (71%) of the 24 patients in group 2 had chronic renal disease, defined as a record of renal disease and rise in plasma creatinine level for a period of not less than five months. The remaining seven patients in group 2 (29%) had an elevation in plasma creatinine level recorded for a period of not less than seven days, and were thus deemed to have an "acute rise."

All but three of the patients in group 3 required maintenance hemodialysis at the time of their participation in the study. Following approval by the appropriate institutional review boards and the acquisition of informed consent, 35-mm slides were taken of the irides of these patients as they were seen at the renal clinics, on admission to the hospital, or as they were receiving hemodialysis, between the period of November 1977 and December 1978. A Medical Nikkor lens, with a self-controlled strobe ring flash at a magnification of X1.75, was used to obtain transparencies that included the necessary landmarks required by the iridologists to make their analysis. The camera used belonged to one of the iridologists, so that the pictures obtained were of a quality to which he and most iridologists were accustomed. Photographs were obtained in a total of 48 cases. Age, sex, range of plasma creatinine level,
and other considerations are included in Table 1.

An attempt was made to minimize the number of those patients undergoing hemodialysis as it is known that the procedure itself accelerates vascular changes.21 Three (12.5%) of the group 2 patients were known to have hypertension, a condition that affects the retinal vasculature and could potentially alter the iridal vasculature as well (no known reported cases).

### Selection of Controls

A comparison group was selected from male and female inpatients more than 21 years old at the University of California Medical Center in San Diego. These patients were known to have normal renal function on the basis of plasma creatinine values falling within the normal range. Photography of the iris was performed on the date the plasma creatinine level was ascertained or within a period of five days. This group, labeled group 1, comprised a total of 95 patients. None of the patients had a history of any degree of renal failure. Six (6.3%) were known to have hypertension, and three (3.2%) were known to have diabetes mellitus.

### Presentation of the Slides to the Observers

All slides were coded, then arranged in a random fashion, using a table of random numbers. The slides were presented to the iridologists in the accustomed manner: the right and left eye slides were projected simultaneously on rear projection screens, using individual projectors for each eye. Each iridologist viewed the slides individually in his own office and in the company of a registered nurse, unfamiliar with both the slides and their sequence, who recorded the iridologist's analysis. The observers were given the option of rejecting any slides that they thought were of a quality rendering analysis impossible or errant; however, they were asked to give an estimate of the renal function on the basis of these slides and to state the reasons for their rejection.

Each screener was interviewed prior to the analysis to be certain he or she understood the distinction between the three groups in terms of renal function. Each was told the number of the slides to be viewed and that he or she could take as long as necessary to analyze the slides. None knew the number in each group, or the ages of those involved. All were asked to make whatever comments they thought would be helpful during their analysis, assessing limitations existing in this form of analysis.

### The Observers

All three iridologists were in community practice. Two have DC (doctor of chiropractic) degrees, and one has received a degree in iridology alone under the direction of an expert in the field. One of the iridologists (observer A) is world renowned for his work in iridology and the author of what is considered the most popular book in America on iridology. Two of the iridologists have been using the technique as their primary method of analysis of patients for more than 40 years; the third (observer B), for three to four years.

All three iridologists were interviewed prior to their analyses. While they were aware that a scientific study of this kind had never been performed in iridology, to their knowledge it was within the realm of iridology to discriminate the three levels of kidney function in question, and they were accustomed to analyzing patients as if this were so. Their criticisms of the technique used for analysis, which could have limited their accuracy in this study, were as follows: (1) Brown eyes are difficult to diagnose. This observation has been made by physicians performing iris angiography. The apparent explanation is that the increased pigment "sequesters" the trabeculae. (2) Iridologists are accustomed to analyzing the entire iris, and found it difficult to concentrate on only the kidney area. (3) The iris photos are two-dimensional. When an iridologist is to make an important analysis, he prefers the patient to be present before him so that he might better see depth in the iris to judge the chronicity of the lesion. (4) Iridologists are accustomed to analyzing each kidney separately rather than assessing overall kidney function.

### RESULTS

#### The Iridologists

In the initial data analysis, patients were divided into those with kidney disease (groups 2 and 3) and those without (group 1) to determine if the observers could significantly distinguish these two groups (P<.05). The results of their analyses are shown in Table 2.

Observer A, our best screener using iridology, correctly identified those with kidney disease (groups 2 and 3) 57% of the time, and likewise correctly identified those with no disease 57% of the time. These results were of neither statistical nor clinical significance (P>.05), and did not improve when those patients with only moderate kidney dysfunction (group 2) were eliminated to determine if he could distinguish normal subjects (group 1) from those with renal failure (group 3).

Observer B correctly identified 37% of the patients with disease (groups 2 and 3), incorrectly labeling 63% of them as normal. He correctly identified 56% of those in group 1 (normal subjects) and incorrectly ascribed disease to 44% in this same group. He likewise did no better distinguishing group 1 from group 3.

Observer C accurately diagnosed kidney disease in 88% of cases, and in 95% of cases with severe kidney fail-

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### Table 1.—Clinical Comparison of Groups

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. (%) of patients</td>
<td>95 (98)</td>
<td>24 (117)</td>
<td>24 (17)</td>
</tr>
<tr>
<td>Age range, yr</td>
<td>21-80</td>
<td>24-73</td>
<td>21-74</td>
</tr>
<tr>
<td>Sex, % male</td>
<td>57.9</td>
<td>70.8</td>
<td>54.2</td>
</tr>
<tr>
<td>No. (%) with hypertension</td>
<td>6 (6.3)</td>
<td>3 (12.5)</td>
<td>4 (16.6)</td>
</tr>
<tr>
<td>No. (%) with diabetes mellitus</td>
<td>3 (12.5)</td>
<td>5 (20.8)</td>
<td>2 (8.3)</td>
</tr>
<tr>
<td>Creatinine, mg/dL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>0.8</td>
<td>2.5</td>
<td>10.6</td>
</tr>
<tr>
<td>SD</td>
<td>0.18</td>
<td>1.09</td>
<td>3.37</td>
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</tbody>
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ure. This accuracy seems to approach the accuracy of the creatinine test, yet he identified normal patients correctly only 12% of the time, identifying them as having renal disease 88% of the time (false-positives). Thus, his seeming accuracy at identifying kidney disease is more correctly attributed to his diagnosis of the disease in nearly all patients. Statistical analysis rendered a $P$ value of .42.

The eye, like all parts of the human body, changes with age. Arcus senilis and pterygium are well-recognized pathological features seen in the aged eye but not often in those of younger persons. Both limit visualization of the iris. In addition, the relationship of age to the lucidity of the characteristic anatomy of the iris is inverse. Bearing these considerations in mind, we speculated that the observers might improve their results by eliminating those patients and controls over the age of 40. There remained 12 subjects and 40 controls. The results again showed no sensitivity or specificity, and all statistical test results showed $P > .05$.

### The Ophthalmologists

The results of the three ophthalmologists were no more impressive (Table 3). They were asked to assess the level of kidney function by whatever methods they could best do so from the 35-mm slides of the irides and surrounding conjunctiva. Totally avoiding the iris, their method of analysis involved three characteristics: (1) cataracts, from the conclusion that cataracts are of increased incidence in those patients with kidney disease requiring corticosteroid therapy, (2) edema and anemia of the conjunctiva, and (3) characteristic signs of hypertension in conjunctival vasculature.

Using the .05 level of significance, the task was equaled by one of the ophthalmologists (observer D). Achieving the best results, observer D correctly assigned a disease category to 55% of patients with disease, incorrectly labeling 45% as normal. Observers E and F were less accurate. Their results similarly did not improve when selecting for age of less than 40 years. Table 4 summarizes the screening results of the six observers.

### Predictive Value of the Screening Tests

In our study population, 33% of the patients had renal disease. Yet the true incidence in the population is much less. Information from the National Kidney Foundation in 1978 suggests that 13 million Americans suffer from "all types of renal and urinary tract disease." This is approximately 6% of the general population. This same report states that 42,000 persons per year require chronic dialysis (0.02% of the general population). We might surmise that in the general population the true incidence of renal disease of the type with which we dealt in this study is much less than 6%.

### Table 2. — Ophthalmologists' Data Analysis

<table>
<thead>
<tr>
<th>% of Patients</th>
<th>With Disease</th>
<th>Without Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>True-Positive</td>
<td>False-Negative</td>
<td>True-Positive</td>
</tr>
<tr>
<td>(Sensitivity)</td>
<td>(Specificity)</td>
<td>(Sensitivity)</td>
</tr>
<tr>
<td>Observer A</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>Observer B</td>
<td>57</td>
<td>43</td>
</tr>
<tr>
<td>Observer C</td>
<td>88</td>
<td>12</td>
</tr>
</tbody>
</table>

### Table 3. — Medical Observers' Data Analysis

<table>
<thead>
<tr>
<th>% of Patients</th>
<th>With Disease</th>
<th>Without Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>True-Positive</td>
<td>False-Negative</td>
<td>True-Positive</td>
</tr>
<tr>
<td>(Sensitivity)</td>
<td>(Specificity)</td>
<td>(Sensitivity)</td>
</tr>
<tr>
<td>Observer D</td>
<td>55</td>
<td>45</td>
</tr>
<tr>
<td>Observer E</td>
<td>53</td>
<td>47</td>
</tr>
<tr>
<td>Observer F</td>
<td>23</td>
<td>77</td>
</tr>
</tbody>
</table>

Knowing the true prevalence of renal disease in the population, one can determine the predictive value of the screening test. When the disease prevalence is relatively low, as in renal disease, even a fairly specific test will yield many false-positives and poor predictability. Assuming that the prevalence of renal disease in the population is not more than 2% (a figure believed reasonable by our renal consultant [J.A.M.]), we can go on to calculate the true value of iridology as a screening tool.

Our best iridology screener was observer A, who obtained a rate of 57% true-positives and 43% false-positives. By his predictions, in a population of 1,000, disease will occur in 20 (2%), no disease in 980. There will be 11 true-positives (0.57x20) and 421 false-positives (0.43x980), totaling 432. The predictive value is therefore 11/432 or 2.5%.

Thus, 2.5% of those identified by our best screener as having renal abnormalities in the general population will actually have disease.

The best score obtained by an ophthalmologist was observer D, whose true-positive rate was 55%, and false-positive rate 38%. Using the same format for calculation of predictability, one obtains a predictive value of approximately 3%. Though better than that obtained by the iridologists, the predictive value of the screening technique used by the ophthalmologists in assessing kidney disease is not clinically appropriate.

One may contrast the accuracy of the plasma creatinine level, a standard used by Western medicine to distinguish normal from abnormal patients. Normal creatinine level is defined by the range found in 95% of the healthy population. The normal population in this study had a mean plasma creatinine level of 0.8 mg/dL.
with a standard deviation of 0.18, and hence more likely is distributed within a range in which 98% of the normal population lies. Even so, using the 95% figure, 19 of 20 with disease will be correctly identified, whereas 5% of the normal population (in this example, 49 persons) will be incorrectly identified as abnormal and asked to undergo further testing. The predictive value is that 28% of those identified as abnormal will actually be so. Although this may not reflect an ideal level of accuracy that 49 of 1,000 people in the normal population will undergo further testing to be certain of their health, still it is considered worthwhile to identify and help the 95% with disease who might otherwise go on to develop sequelae of renal disease. The 2.5% level of renal disease diagnostic accuracy with iridology—only 11 of 20 patients with disease are correctly identified, while 421 normal people are identified as having disease—does not warrant reliance on this technique in the detection of renal disease.

COMMENT

Clearly, none of the six observers in this study derived data of clinical importance or significance. Yet, the negative implications are significant. Iridology is a practice of growing interest among those turning to holistic health care and alternative methods. Offering the dual attraction of simplicity and mystique, it provides to some people a welcome alternative to the often painful and indisposing diagnostic procedures of traditional medicine. Articles about iridology have recently appeared in the lay press (Esquire, Cosmopolitan, Cleo, local newspapers, television, and radio programs). Ophthalmologists and family practitioners are often asked by their patients about the technique.

The results of this study show that there is no value in iridology as a screening technique for detecting or diagnosing kidney disease. Patients should seek other, more traditional diagnostic means to draw conclusions in conjunction with their iris examination. Beyond this, one must question the negative value. There is the serious potential psychological harm to the subject of carrying the burden of detected “disease.” Of greater interest to physicians is the false-negative “analysis.” One of the observers (an iridologist), who employs the technique and draws conclusions based on it, correctly identified only 26% of the patients undergoing dialysis as having kidney disease. Physicians are well aware of the harm that can come to these patients if they were to rely on iridology and thereby go without proper treatment.

Elizabeth Barrett-Connor, MD, and Brandon Lower. JAMA, Sept 28, 1979—Vol 242, No. 13

References