

# Contrast Sensitivity Testing: 20/20 and More

CST may offer the most precise way to measure visual quality.

BY LESLEY RANFT

**C**ontrast sensitivity testing (CST) is designed to allow for effective diagnosis of vision impairments that cannot be detected with a Snellen chart, such as limits to field of vision (peripheral), the appearance of visual disturbances, and difficulty in mesopic or scotopic conditions. Such visual impairments may warrant correction where Snellen testing may not, thus having a significant impact on a patient's quality of vision.

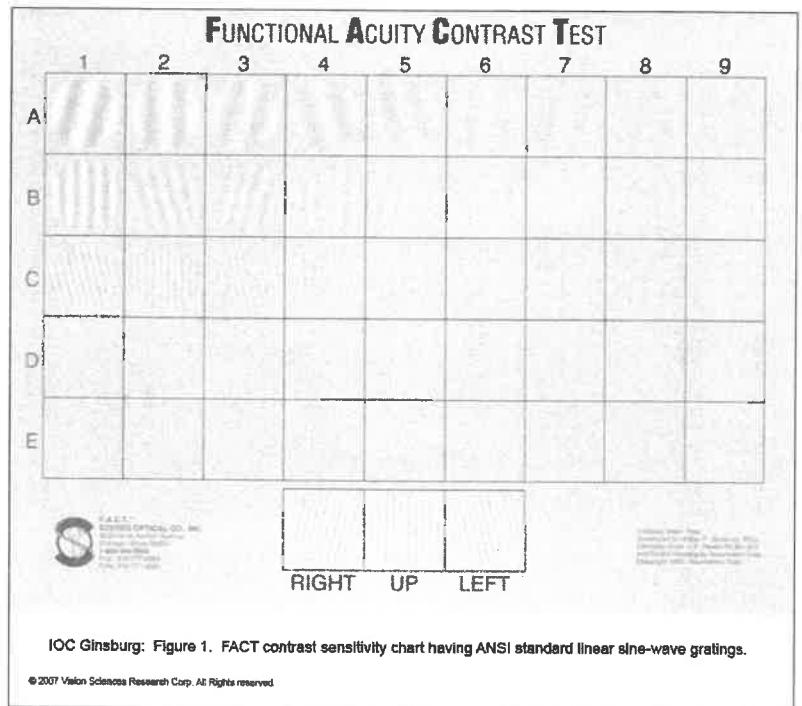
This article will discuss whether contrast sensitivity should be part of routine clinical examinations as well as what technology is available. Finally, we offer points to consider when adding CST to your armamentarium.

## Building Awareness

Contrast sensitivity testing is used to detect and quantify changes that a solid black-and-white eye chart cannot. Poor quality vision not only creates significant public expenditures, but also impairs day-to-day life for many individuals. "The Snellen test measures high contrast acuity," Steven Schallhorn, M.D., the recently retired Navy Director of Refractive Surgery, of San Diego, explains. "However, many daily tasks are performed in a low-contrast environment. The effects of impairment in this environment on daily life

can be significant. As such, we cannot disregard patients' complaints about visual difficulties that are not quantifiable on a Snellen chart." He feels that the medical community is just beginning to appreciate the advantages of CST.

An additional problem in diagnosing these kinds of vision impairments is that patients may not understand or



IOC Ginsburg: Figure 1. FACT contrast sensitivity chart having ANSI standard linear sine-wave gratings.

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express terms that signify low-contrast or low-light vision impairment. They are so familiar with the direct vision approach in the Snellen chart that an "I can see" response may be all that is qualified during an ophthalmic visit. Ophthalmologists have to probe to uncover the difficulty that patients may have performing daily activities due to quality-of-vision problems.

"The ability for contrast sensitivity testing to establish a quality of vision baseline for patients helps to provide faster diagnosis and treatment of vision impairment in years to come," says Arthur Ginsburg, Ph.D., M.S.E.E. founder of Vision Sciences Research Corporation. "This, in turn, helps to leverage patient care."

### Choosing a Vendor

If you are thinking of adding CST to your practice, a multi-pronged approach should entail the following:

■ **Gather plenty of information.** Attending annual eye-care meetings provides the opportunity to see demonstrations of various CST equipment. Because a number of staff

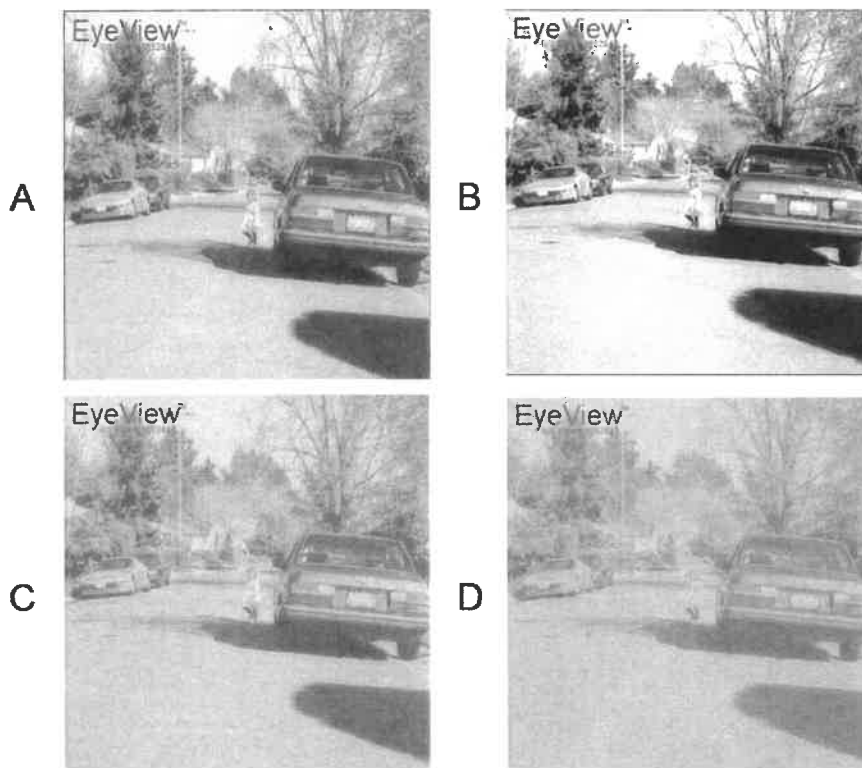
members may be using the technology, it is important to receive feedback on demonstrations from everyone who will use the system. With many vendors available at one place, a medical office can compare the costs and weigh the benefits of each system. Do not underestimate the importance of references. Vendors may provide these or you can obtain them by posting a query on an organization's message boards. When asking, it might be helpful to site specifics about the practice, including the size and the focus of the practice-reimbursed medicine and/or cash pay.

■ **Consider performance adaptability.** Fortunately, the FDA has recently developed certain standards for CST, such as in the application of CST for the introduction of new medical procedures and the safety of new medical devices. This standard testing can be easily implemented in a clinical practice. Some devices offer a range of different types of tests, specifically designed for evaluation of various disease states or quality of vision related to refractive surgery or new technology IOLs. Manufacturers can offer information about the tests that are best for each situation. For example, for

cataract evaluation, typically only one spatial frequency is needed for testing.

■ **Question product reliability.** It is also important to identify the dependability of the product that the practice is most interested in purchasing. Brian Boxler-Wachler, M.D., of Los Angeles, explains, "It is critical to note that the contrast sensitivity equipment should be tested to determine the reliability of the product. It's also important to evaluate the studies that have been associated with the product and have an understanding of ways to enhance outcomes identified by the test, such as through the use a retro-illuminated chart." Dr. Boxler-Wachler has been using contrast sensitivity testing from the time he was a resident and has conducted extensive

### Comparison of Image Quality Based on Contrast Sensitivity



IOC Ginsburg: Figure 2. Comparison of image quality based on EyeView contrast sensitivity processed images. A is the original image. B is the image created by increasing the average contrast sensitivity of A by + 0.15 log units (+ 41%) resulting in visually improved contrast and detail from A. C is the image created by decreasing the average contrast of A by - 0.15 log units (-29%) resulting in visually poorer contrast and detail from A. D is the image created by decreasing the average contrast of A by - 0.30 log units (- 50%) or B by - 1.5 log units resulting in visually poorer contrast and detail from A and C.

## Making the Best CST Choice for Your Practice

Put together a priority features list and a budget to help you choose the right CST for your practice. In fact, a long-term plan may be most appropriate as there may be "updates" to the technology in years to come. Based on this analysis, you can address other concerns:

1. Is it necessary for the system to replace any other technology or functions now?
2. What are the typical incompatibility issues for this device?
3. What is the integration process and time commitment for all parties?
4. What are typical stumbling blocks that can be encountered during integration?
5. What has been the experience of the quality of conversion from your specific technology version from the manufacturer to another?
6. Is the equipment easy to use?

7. Based on practice focus, how expansive does the technology need to be? For example, is it important for the technology to measure near and far acuity, with or without glare? There are "all-in-one options" available as well as options that are specific to the practice focus.
8. What is the cost of adding new features?
9. What are installation and training costs?
10. What kind of support is available?
11. Are there upgrades that may be required, and is there a charge or discount available?

As David Evans, Ph.D., of La Jolla, Calif. explains, "The contrast sensitivity product should be standardized, have validation work published in the scientific literature and meet the FDA requirements for contrast sensitivity testing. Also, since contrast sensitivity testing should always be accomplished by best correction, it is best to choose a device where it is easy to use with the phoropter or trial lenses."

research in this area.

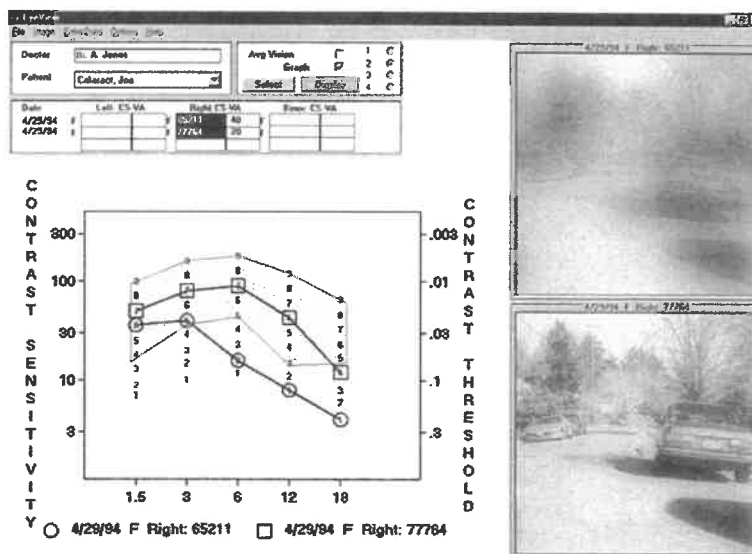
■ **Remember insurance reimbursement.** Although the CTP code designation for contrast sensitivity testing was removed from third-party administrator and government funded standards, CST still plays an important role in demonstrating the necessity for surgery — as well as demonstrating to the patient that surgery is necessary.

"We have an objective test that we can use in the clinic that can justify the need for surgery," says Mark Packer, M.D., of Eugene, Ore. "Although we do not have the use of the CPT code for contrast sensitivity testing reimbursement, I have never witnessed a claim denial when I have provided the results of a contrast sensitivity test and an investigative patient questionnaire."

Additionally, contrast sensitivity testing may offer further evidence that a surgical procedure is successful. In the preferred practices under the summary of recommendation for photo refractive keratectomy surgery, the Federal Trade Commission notes that, "It is important to keep in mind that the fact that the FDA has approved the excimer laser for use in PRK does not, by itself, necessarily provide adequate substantiation for all specific claims about the success of the procedure."

■ **Check the technical support.** Make sure you evaluate technical support and ongoing costs. Support and upgrade pricing can vary between providers. Support may be provided via e-mail or over the phone, and some manufacturers make it available 24 hours a day.

### Comparison Between Pre- and Post Cataract Surgery



IOC Ginsburg: Figure 3. Comparison between contrast sensitivity pre- and post-cataract shows significant increased visual quality.

**Multiple Ghost Images Reported by a Complaining LASIK Patient**



IOC Ginsburg: Figure 4. Multiple ghost images were reported by a complaining LASIK patient and resulted in the self-directed digitally image-processed ETDRS letter acuity chart. These sharp edged images, apparently due to higher order aberrations seen by this patient, are not typical of images created from the point spread functions obtained from wavefront aberrometry and suggest further visual processing by the visual system.

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**Demonstrate Good Will**

Investing in CST equipment and educating patients about contrast sensitivity demonstrates your practice's concern for your patients' quality of vision in their everyday lives — in preserving their safety and even independence in advancing years. These investments can go a long way in terms of patient acquisition. Increased patient satisfaction often equates to more word of mouth referrals and greater revenue. Regardless of whether you decide to purchase CST equipment, it is probably wise to involve yourself in activities that broaden consumer awareness about quality of vision.

"There are many tools available that would provide the ability to help assess and educate patients for contrast impairment," says Cynthia Owsley, M.S.P.H., Ph.D., professor of ophthalmology, and vice chair for Clinical Research, Department of Ophthalmology, School of Medicine at the University of Alabama at Birmingham. "It is important to evaluate the specific tools that would be most relevant to the practice."

Here are some final suggestions to achieve that end:

▶ Dr. Boxer-Wachler recommends investigating courses available through eyecare professional societies that review topics like quality of vision in refractive surgery.

▶ Ask patients about the about the subtle differences they may experience with their vision, despite results of the

Snellen chart test, says Dr. Schallhorn. Record this information in the patient's chart.

▶ Dr. Ginsburg advises using tools that demonstrate to the patient that CST is a necessity. Manufacturers offer supporting software demonstrations, charts and tables.

▶ Consider participating in hospital committees to offer lectures on quality of vision. For example, a lecture on the topic of vision impairment as it relates to the impact of loss of independence in day-to-day life may be a newsworthy topic.

▶ Initiate a public relations strategy with a public service announcement, press release, patient seminar, newsletter or direct mail campaign to get your message out to the public. Let referring doctors know your stand on quality of vision.

▶ Contact policy makers in your state to inform them about your stand on quality of vision and CST. Site statistics and examples to support your point of view. Also mention actions that you wish the policy maker to support, such as

funding for research, further support from Medicaid and/or state funding to assist with costs for practices.

**"I have never witnessed a claim denial when I have provided the results of a contrast sensitivity test and an investigative patient questionnaire."**

The problems that result from poor quality of vision cannot be corrected overnight. It's a national problem that deserves national attention. Closer to home, a practice's demonstration of understanding patient needs coupled with a tech-savvy office, can only create a win-win solution. CST is a great move for any practice — as long as the selection and implementation of a system are researched and selected with caution and business savvy. **OM**

**Lesley Ranft** is a freelance writer based in San Diego, specializing in ophthalmology.