CURVEBALLS, FASTBALLS, AND EYEBALLS

Incorporating sports vision performance into your practice can diversify your patient offerings and increase your profitability.

BY VITTORIO MENA, OD, MS; AND ELISE KRAMER, OD, FAAO, FSLS

Many patients today are conscientious about maintaining a healthy and happy lifestyle that includes eating right, exercising, and being involved in sporting activities. Patients of all ages now enjoy participating in sporting events such as biking, golfing, running, tennis, fishing, snowboarding, skiing, and playing in basketball, softball, and soccer leagues. Every patient who walks into our examination lane should be considered a potential athlete.

VISION TESTING

In all activities, visual information and visual processing govern our bodies’ movements. Because 80% of all the sensory information sent to the brain is received visually,1 visual information and visual processing play a big role in our everyday lives, from learning to sports performance.

Many sports require the athlete to follow a target at various speeds, a task that can involve up to four different types of eye movement: pursuits (125 ms), saccades (200 ms), vestibulo-ocular reflex, and vergence.2 At high speeds, vision during saccades is reduced due to saccadic suppression. Athletes who participate in visually demanding sports such as baseball, tennis, and hockey are believed to have faster smooth pursuits, the ability to suppress the vestibulo-ocular reflex and, from time to time, the ability to employ an anticipatory saccade.2

At least 15 vision-related skills are needed for great sports performance. These include depth perception, eye tracking, eye coordination at both distance and near, fixation accuracy, color perception, sustained focus at both distance and near, peripheral awareness, gross visual-motor coordination, fine visual-motor coordination, three-speed visual recognition, visual perception, and visual localization.3

Optometrists should consider all three forms of VA (static VA, dynamic VA [DVA] and contrast sensitivity)4 when evaluating athletes. Most eye care practitioners routinely test patients’ static VA using the standard Snellen chart at a distance of 20 feet. The other two types of VA testing are less frequently used.

DVA testing is crucial for athletes involved with motion, especially goalkeepers, baseball players, and tennis players. DVA testing examines whether the test target or the athlete himself or herself is in motion. DVA can be tested using a Kirschner rotator, Landolt rings that suddenly
appear on the screen at a constant velocity, or a tachistoscope. Training with a tachistoscope presentation can improve the concentration and attention that are crucial for athletic performance because it helps train the athlete to consciously recognize objects. It has been reported that regular exercise across one’s lifetime helps maintain DVA, preventing age-related declines and probably enhancing neural plasticity. Improving contrast sensitivity can help athletes detect white balls against different backgrounds. Contrast sensitivity can be tested using the Vistech contrast test system, the Stereo Optical sine wave contrast test, and the Pelli-Robson contrast sensitivity chart.

THE VISUAL SYSTEM
When we assess an athlete, the health and accuracy of his or her visual system is of primary importance. This includes overall ocular health, static VA, DVA, contrast sensitivity, binocular vision performance, depth perception and stereopsis, accommodation, eye-hand and eye-body coordination, central peripheral awareness, color vision, and ocular dominance. Each of these is a crucial element in different sporting tasks, so they need to be addressed appropriately. Just as any good foundation starts at the base, we work up the vision pyramid to ultimately help the athlete excel visually on the field (Figure).

VISION TRAINING
The goals of sports performance vision training are to transform a good athlete into an elite athlete and to minimize the risk of injury during play. Athletes want to be able to concentrate during gameplay and to be superior to their opponents. Training can be done at home, in the office, or in a team’s training facility (see Visual Exercises).

Research by Loran and Griffiths suggests that, if two athletes of similar caliber meet in competition, one of whom has a better trained visual system, the athlete with the enhanced visual system will perform better. Research shows that neurons that fire together are wired together. That is, when an athlete practices, the nerves in the brain start networking and creating patterns so that movements become automatic.

Training exercises are tailored to specific sports, and, generally, a training program is done during the preseason, 2 to 3 days a week for 20 to 30 minutes for at least 6 weeks, or six times a week for 20 to 30 minutes for 2.5 weeks. The athlete must then maintain a training regimen once a week during the regular season for these sports vision training exercises to sustain the level achieved before the season.

GAME CHANGER
According to the Centers for Disease Control and Prevention, nearly 30 million children and adolescents in the United States participate in youth sports. Incorporating sports performance vision into your everyday optometric practice will set you apart from your competition. It will expand the services that you are able to offer your patients, which will ultimately lead to more patients coming to your practice.

VISUAL EXERCISES
Exercises That Can Be Done at Home
- Hart charts
- Visual tracing
- Red-green accommodative rock
- Marsden ball
- Pegboard rotator
- Brock string
- Lifesaver cards
- Pointer and straw
- Peripheral wall chart

Office or Training Facility Exercises
- NeuroTracker (NeuroTracker)
- Wayne Saccadic Fixator (Wayne Engineering)
- RightEye (RightEye)
- Senaptec Sensory Station (Senaptec)
- Strobe training (Figure, A)
- Lightboard training tools (Figure, B)
- Bassin Anticipation Timer (Lafayette Instrument)
- King-Devick Test (King-Devick Technologies)
- Accommodative flippers and loose lens rock

Figure. Lt. Col. Richard Baird, OD (left), and Vittorio Mena, OD (right), holding strobe goggles (A); and Dr. Mena interacting with lightboard training tools attached to the wall (B) at a sports vision workshop.
Adding these services will create variety in your practice while also assisting athletes in improving their vision, allowing them to quicken their sensory processing, develop more accurate eye movements, and improve their athletic and academic performance, while also reducing eye and head injuries.

To play well, an athlete must see well. Sports vision performance testing and training can help athletes maximize efficiency and accuracy in order to play to the best of their ability.


VITTORIO MENA OD, MS
- Sports Vision Director, Optical Academy, Clifton, New Jersey
- Clinical Director, New Jersey Special Olympics Lions Club International Opening Eyes Program
- Membership Chair, Hudson County, New Jersey, Society of Optometric Physicians, Hudson County, New Jersey
- menavitt@gmail.com
- Financial disclosure: None

ELISE KRAMER, OD, FAAO, FSLS
- Optometrist, Miami Contact Lens Institute, Miami
- elise@miamicontactlens.com
- Financial disclosure: Speaker (BostonSight, Euclid Systems Corporation, Spectrum International)