# CLINICAL DIAGNOSIS

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C.W., a 7-year-old male, presented with his parents for another opinion, seeking treatment to improve binocularity. He had been under the care of an ophthalmologist since age 4 years. At that time, glasses were prescribed to correct a right esotropia. Occlusion therapy also was recommended, and was done consistently for several months. Two years ago, bifocal lenses were prescribed to further improve eye alignment. At a recent follow-up, C.W. and his parents were told that visual acuity and the esotropia were adequately corrected with bifocals, and that no further treatment was required. Annual follow-up was advised.

C.W.'s parents remained concerned, however, because they noticed that the right eye still crossed occasionally, even with glasses on. They also observed that C.W. was unable to appreciate three-dimensional pictures in books, and had little interest in them, unlike his siblings. They used the Internet to learn more about visual development and strabismus, and concluded that he must be lacking stereopsis. They were concerned that this might limit his ability to meet future academic or occupational challenges. Therefore they sought a clinic that offered vision therapy treatment.

C.W.'s habitual spectacle prescription was:

| | | |
|---|---|---|
| OD | +2.50 –1.25 x 001 | +3.25D add (ST 28) |
| OS | +2.50 –1.00 x 178 | +3.25D add (ST 28) |

Entering aided visual acuities were 20/25+ right eye, 20/20 left eye at distance and 20/20 each eye at near. Cover test, through distance correction, showed 2 pd right esotropia at distance and 20 pd right esotropia at near. The bifocal neutralized the deviation at near, leaving 2 pd residual esophoria. Dynamic retinoscopy showed no lag or lead of accommodation through the add, confirming accurate accommodative function. Extraocular muscle movements were full and smooth for both eyes; the deviation was comitant in all directions of gaze. Diplopia was reported on Worth 4 Dot testing at distance, with flat fusion achieved at near (through the bifocal). There was no appreciation of stereopsis, by Titmus Stereofly or Randot tests. Suppression was demonstrated on attempted testing of convergence and divergence ranges at near.

Cycloplegic refraction revealed:

| | |
|---|---|
| OD | +3.25 –1.50 x 001 |
| OS | +2.50 –1.00 x 178 |

Anterior and posterior segment examination, through dilated pupils, was unremarkable.

*What is the diagnosis in this case?*

*Is further treatment necessary?*

*What treatment options are available, to improve binocularity further?*

(see page 85)

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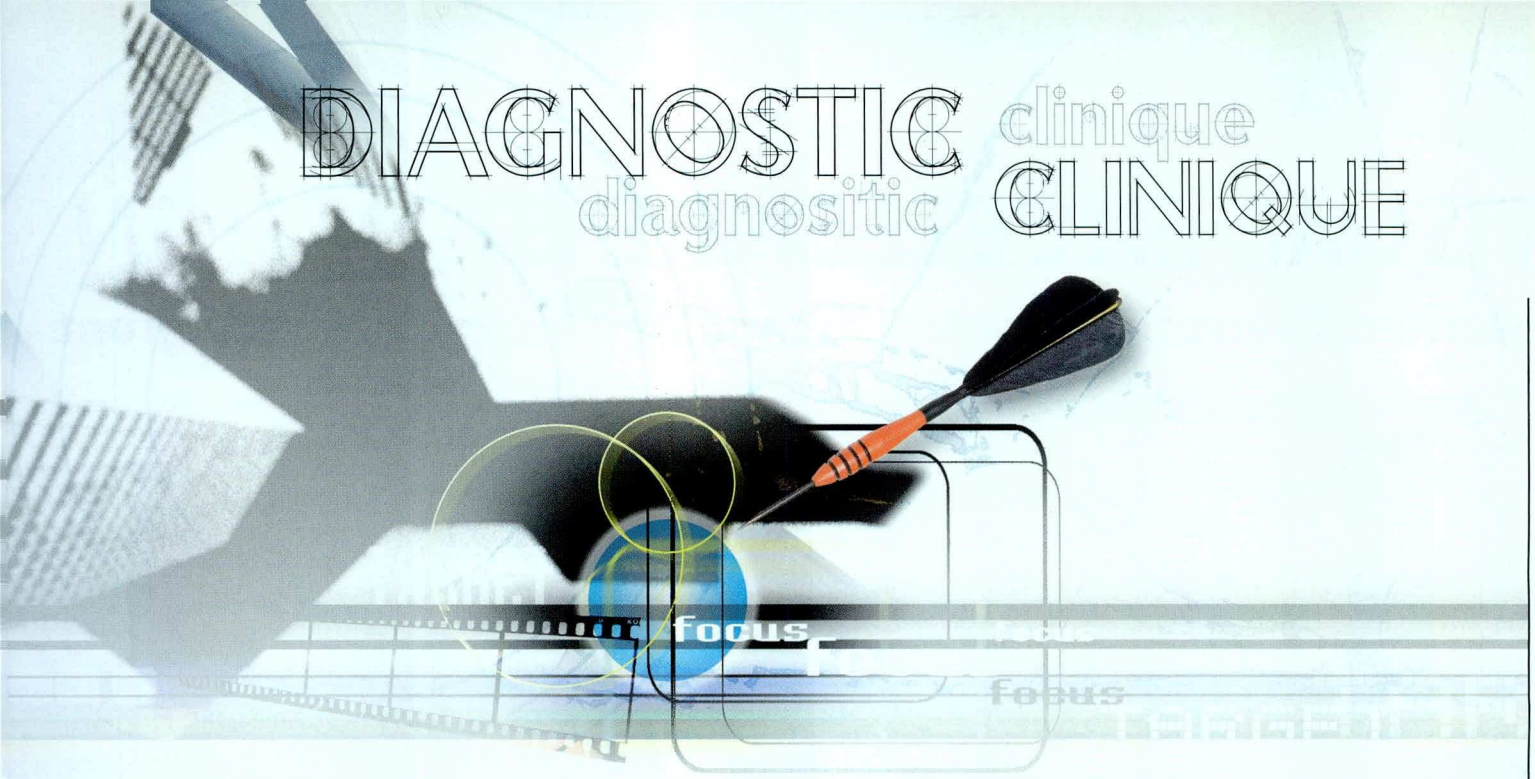
C.W., un garçon de sept ans, s'est présenté avec ses parents pour une seconde opinion sur un traitement pour améliorer la vision binoculaire.

# DIAGNOSTIC clinique
# diagnositic CLINIQUE




Il avait été sous les soins d'un ophtalmologiste depuis l'âge de quatre ans. À ce moment-là, on lui avait prescrit des lunettes pour corriger une isotropie à l'œil droit. On avait aussi recommandé un traitement par occlusion, qui s'est poursuivi de la même manière pendant plusieurs mois. Il y a deux ans, des lentilles bifocales ont été prescrites pour améliorer le réalignement des yeux. Lors d'un récent examen de suivi, on a dit à C.W. et à ses parents que l'acuité visuelle et l'isotropie avaient été corrigées correctement avec les lentilles bifocales et qu'aucun autre traitement ne serait nécessaire. On leur a suggéré un suivi annuel.

Toutefois, les parents de C.W. sont demeurés inquiets parce qu'ils ont remarqué un strabisme occasionnel à l'œil droit, même avec des lunettes. Ils ont aussi remarqué que C.W. était incapable de saisir des images tridimensionnelles dans les livres et y trouvait peu d'intérêt, au contraire de ses frères et sœurs. Grâce à l'Internet, ils se sont renseignés sur le développement visuel et le strabisme et sont venus à la conclusion que l'enfant devait avoir un défaut de la vision stéréoscopique. Ils se sont demandé si cela ne serait pas un handicap futur dans sa vie scolaire ou professionnelle. Ils ont alors cherché une clinique qui offrait un service de thérapie visuelle.

La prescription des lunettes ordinaires de C.W. était :

| | | |
|---|---|---|
| OD | +2,50 – 1,25 x 001 | +3,25D Ajout (ST 28) |
| OS | +2,50 – 1,00 x 178 | +3,25D Ajout (ST 28) |

L'acuité visuelle aidée, avant correction, était de 20/25+ OD et de 20/20 OS de loin et 20/20 de près pour chaque œil. Le test à l'écran, après correction de la vision éloignée, indiquait une ésotropie à l'œil droit de 2 dp de loin et une ésotropie à l'œil droit de 20 dp de près. Les lunettes bifocales ont neutralisé la déviation de près, avec une ésophorie résiduelle de 2 dp. La réthinoscopie dynamique ne montre aucun retard ni progrès de l'accommodation grâce à la correction, ce qui confirme une fonction accommodative correcte. Les mouvements des muscles de l'orbite étaient entiers et souples pour chaque œil; la déviation était concomitante, quelle que soit la direction du regard. On signale une diplopie à distance au test de Worth 4 Dot, avec fusion à plat réalisée en vision de près (grâce aux lentilles bifocales). Il n'y a eu aucune évaluation de la stéréopsie par les stéréotests Titmus ou Randot. On a démontré la suppression en réalisant des tests de convergence et de divergence de près.

La réfraction cycloplégique a révélé :

| | |
|---|---|
| OD | +3,25 – 1,50 x 001 |
| OS | +2,50 – 1,00 x 178 |

L'examen des segments antérieur et postérieur, avec pupilles dilatées, n'a rien révélé de spécial.

*Quel est le diagnostic dans ce cas-ci?*

*Faut-il poursuivre le traitement?*

*Quels sont les traitements disponibles pour améliorer la vision binoculaire?*

(voir la page 87)

## Esotropia

from page 60

The diagnosis is accommodative esotropia secondary to hyperopia and high AC/A ratio.

The esotropia was adequately neutralized with the current bifocal spectacle correction. Esophoria with second-degree fusion (flat fusion) was achieved at near, through the add. A small angle esotropia remained at distance. Cosmesis was good. Many clinicians would agree that this level of correction is sufficient, and that further improvement in binocularity is not likely to occur at this age.

It is possible, however, to improve binocularity through vision therapy, with proper instruction and motivation. C.W. was judged to be a mature and co-operative 7 year-old, and his parents were extremely eager to pursue any therapy that might promote the development of stereopsis.

A home-based vision therapy program was designed:

❶ *Optical Correction*

The cycloplegic refraction indicated increased hyperopia in the right eye. This was considered significant, and a change in spectacle prescription was recommended, to encourage more accurate ocular alignment. No modification of the nearpoint add was recommended, since this would restrict the working distance at near. Relieving prism (2 pd base out OD) was not recommended since it did not improve fusion when demonstrated. The final spectacle correction, for continued full time wear, was:

| | | |
|---|---|---|
| OD | +3.25 –1.50 x 001 | +3.25 add (ST 28) |
| OS | +2.50 –1.00 x 178 | +3.25 add (ST 28) |

❷ *Anti-Suppression Therapy*

Anti-suppression therapy was initiated at near, to teach conscious awareness of binocular fixation. C.W. was instructed in the use of the Polaroid Bar Reader, and was able to read without suppression, with some effort. Other, more active therapy procedures to eliminate suppression also were demonstrated. C.W. was unable to understand the concept of physiological diplopia inherent in the Beads on String exercise. He also was unable to perceive anaglyphic targets (red and green pictures, Lego, crayons) through red-green glasses. Anti-suppression therapy therefore was limited to the Polaroid Bar Reader, practiced 20-30 minutes per day for the first month of therapy.

❸ *Monocular Visual Function Therapy*

In cases of strabismus and amblyopia, the non-dominant eye may continue to demonstrate deficiencies in accommodation and motility (saccades, pursuits), even after ocular alignment and visual acuity have been improved. Vision therapy procedures such as Hart Chart, lens flippers, visual tracings and eye tracking are effective in improving monocular visual function. These were not prescribed to C.W. since accommodation and monocular pursuits were within normal limits at the initial visit.

After one month of wearing the new spectacle prescription, and practicing anti-suppression therapy daily, C.W. presented for re-evaluation. Aided visual acuities were 20/20 each eye at distance and at near. Cover test showed intermittent right esotropia (less

# Pr Visudyne*
## verteporfin for injection

**PRESCRIBING INFORMATION** (September 2004)

**PrVisudyne*** Verteporfin for Injection for Intravenous Use

PHOTOSENSITIZING AGENT FOR AGE-RELATED MACULAR DEGENERATION, PATHOLOGIC MYOPIA AND PRESUMED OCULAR HISTOPLASMOSIS

VISUDYNE* (verteporfin) is a drug to be used in Visudyne* Therapy. Visudyne* Therapy is a two-stage process requiring administration of both verteporfin for injection and nonthermal red light.

CAUTION: Visudyne* Therapy should only be used by physicians trained in the treatment of age-related macular degeneration and pathologic myopia using photodynamic therapy with verteporfin for injection and specified lasers. Following VISUDYNE* injection, residual photosensitivity for 48 hours or more may result in erythema and blistering of the skin when exposed to sunlight or brightly focused indoor light.

**INDICATIONS AND CLINICAL USE** Visudyne* Therapy is indicated for the treatment of age-related macular degeneration, pathologic myopia and presumed ocular histoplasmosis in patients with predominantly classic subfoveal choroidal neovascularization.

**CONTRAINDICATIONS** VISUDYNE* (verteporfin) is contraindicated for patients with porphyria or a known hypersensitivity to any component of this preparation, and in patients with severe hepatic impairment.

**WARNINGS** Following injection with VISUDYNE* (verteporfin), care should be taken to avoid exposure of skin or eyes to direct sunlight or bright indoor light for 2 days. In the event of extravasation during infusion, the extravasation area must be thoroughly protected from direct light until the swelling and discoloration have faded in order to prevent the occurrence of a local burn which could be severe. If emergency surgery is necessary within 48 hours after treatment, as much of the internal tissue as possible should be protected from intense light. Patients who experience severe decrease of vision of 4 lines or more within 1 week after treatment should not be retreated, at least until their vision completely recovers to pretreatment levels and the potential benefits and risks of subsequent treatment are carefully considered by the treating physician.

Caution should be exercised when Visudyne* Treatment under general anesthesia is considered (See PRECAUTIONS).

Use of incompatible lasers that do not provide the required characteristics of light for the photoactivation of VISUDYNE* could result in incomplete treatment due to partial photoactivation of VISUDYNE*, overtreatment due to overactivation of VISUDYNE*, or damage to surrounding normal tissue.

**Pregnancy** TERATOGENIC EFFECTS There are no adequate and well-controlled studies in pregnant women. VISUDYNE* should be used during pregnancy only if the benefit justifies the potential risk to the fetus. Rat fetuses of dams administered verteporfin for injection intravenously at ≥10 mg/kg/day during organogenesis (approximately 40-fold the human exposure at 6 mg/m$^2$ based on $AUC_{inf}$ in female rats) exhibit an increase in the incidence of anophthalmia/microphthalmia. Rat fetuses of dams administered 25 mg/kg/day (approximately 125-fold the human exposure at 6 mg/m$^2$ based on $AUC_{inf}$ in female rats) had an increased incidence of wavy ribs and fetal alterations. In pregnant rabbits, a decrease in body weight gain and food consumption was observed in animals that received verteporfin for injection intravenously at 10 mg/kg/day during organogenesis. The no observed adverse effect level (NOAEL) for maternal toxicity was 3 mg/kg/day (approximately 7-fold the human exposure at 6 g/m$^2$ based on body surface area). There were no teratogenic effects observed in rabbits at doses up to 10 mg/kg/day.

**Nursing Mothers** Verteporfin and its diacid metabolite have been found in the breast milk of one woman after a 6 mg/m$^2$ infusion. The verteporfin breast milk levels were up to 66% of the corresponding plasma levels. Verteporfin was undetectable after 12 hours. The diacid metabolite had lower peak concentrations but persisted up to at least 48 hours. Because the effects of verteporfin and its metabolite on neonates are unknown, either nursing should be interrupted or treatment postponed, taking into account the risks of delayed treatment to the mother. Women should not nurse for 96 hours after Visudyne* Therapy.

**Pediatric Use** Safety and effectiveness in pediatric patients have not been established.

**PRECAUTIONS**

**General** Extravasation of VISUDYNE*, especially if the affected area is exposed to light, can cause severe pain, inflammation, swelling or discoloration at the injection site. The relief of pain may require analgesic treatment.

Standard precautions should be taken during infusion of VISUDYNE* (verteporfin) to avoid extravasation. Examples of standard precautions include, but are not limited to:

- A free-flowing intravenous (IV) line should be established before starting VISUDYNE* infusion and the line should be carefully monitored.
- Due to the possible fragility of vein walls of some elderly patients, it is strongly recommended that the largest arm vein possible, preferably antecubital, be used for injection.
- Small veins in the back of the hand should be avoided.

If extravasation does occur, the infusion should be stopped immediately. The extravasation area must be thoroughly protected from direct light until the swelling and discoloration have faded in order to prevent the occurrence of a local burn which could be severe. Cold compresses should be applied to the injection site (see Warnings).

Visudyne* Therapy should be considered carefully in patients with moderate hepatic impairment or biliary obstruction since there is no clinical experience with verteporfin in such patients.

Chest pain, vaso-vagal reactions and hypersensitivity reactions, which on rare occasion can be severe, have been reported. Both vaso-vagal and hypersensitivity reactions are associated with general symptoms such as syncope, sweating, dizziness, rash, dyspnea, flushing, and changes in blood pressure and heart rate.

There is no clinical data related to the use of VISUDYNE* in anesthetized patients. At a >10-fold higher dose given by bolus injection to sedated or anesthetized pigs, verteporfin caused severe hemodynamic effects, including death, probably as a result of complement activation. These effects were diminished or abolished by pretreatment with antihistamine and they were not seen in conscious non-sedated pigs or in any other species, whether conscious or under general anesthesia. Caution should be exercised when Visudyne* Treatment under general anesthesia is considered (see WARNINGS).

VISUDYNE* at >5 times the expected maximum plasma concentration in treated patients caused a low level of complement activation in human blood in vitro. VISUDYNE* resulted in a concentration-dependent increase in complement activation in human blood in vitro. At 10 µg/ml (approximately 5 times the expected plasma concentration in human patients), there was mild to moderate complement activation. At ≥ 100 µg/mL, there was significant complement activation. Signs (chest pain, syncope, dyspnea, and flushing) consistent with complement activation have been observed in < 1% of patients administered VISUDYNE*. Patients should be supervised during VISUDYNE* infusion.

**Photosensitivity** Patients who receive VISUDYNE will become temporarily photosensitive for 2 days after the infusion. During that period, patients should avoid exposure of unprotected skin, eyes or other body organs to direct sunlight or bright indoor light. This includes, but is not limited to, tanning salons, bright halogen lighting and high power lighting used in surgical operating rooms or dental offices (see Warnings). Prolonged exposure to light from light emitting medical devices such as pulse oximeters should also be avoided for 48 hours following VISUDYNE* administration. If treated patients must go outdoors in daylight during the first 2 days after treatment, they should protect all parts of their skin and their eyes by wearing protective clothing and dark sunglasses. UV sunscreens are not effective in protecting against photosensitivity reactions because photoactivation of the residual drug in the skin can be caused by visible light. Patients should not stay in the dark and should be encouraged to expose their skin to ambient indoor light, as it will help inactivate the drug in the skin through a process called photobleaching.

**Drug Interactions** Drug interaction studies in humans have not been conducted with VISUDYNE*. Verteporfin is rapidly eliminated by the liver, mainly as unchanged drug. Metabolism is limited and occurs by liver and plasma esterases. Microsomal cytochrome P450 does not appear to play a role in verteporfin metabolism. Based on the mechanism of action of verteporfin, many drugs used concomitantly could influence the effect of Visudyne Therapy. Possible examples include the following. Calcium channel blockers, polymyxin B or radiation therapy could enhance the rate of VISUDYNE* uptake by the vascular endothelium. Other photosensitizing agents (e.g., tetracyclines, sulfonamides, phenothiazines, sulfonylurea hypoglycemic agents, thiazide diuretics and griseofulvin) could increase the potential for skin photosensitivity reactions. Compounds that quench active oxygen species or scavenge radicals, such as dimethyl sulfoxide, b-carotene, ethanol, formate and mannitol, would be expected to decrease VISUDYNE* activity. Drugs that decrease clotting, vasoconstriction or platelet aggregation, e.g., thromboxane $A_2$ inhibitors, could also decrease the efficacy of Visudyne Therapy.

**Carcinogenesis, Mutagenesis, Impairment of Fertility** No studies have been conducted to evaluate the carcinogenic potential of verteporfin. Verteporfin was not mutagenic, in the absence or presence of light, when studied in microbial mutagenicity, unscheduled DNA synthesis, mammalian point mutation, chromosome aberration, and mouse micronucleus assays.

Photodynamic therapy (PDT) as a class has been reported to result in DNA damage including DNA strand breaks, alkali-labile sites, DNA degradation, and DNA-protein cross links which may result in chromosomal aberrations, sister chromatid exchanges (SCE), and mutations. In addition, other photodynamic therapeutic agents have been shown to increase the incidence of SCE in Chinese hamster ovary (CHO) cells irradiated with visible light and in Chinese hamster lung fibroblasts irradiated with near UV light, increase mutations and DNA-protein cross-linking in mouse L5178 cells, and increase DNA-strand breaks in malignant human cervical carcinoma cells, but not in normal cells. Verteporfin was not evaluated in these latter systems. It is not known how the potential for DNA damage with PDT agents translates into human risk.

No effect on male or female reproduction has been observed in rats following intravenous administration of verteporfin for injection up to 10 mg/kg/day (approximately 60- and 40-fold human exposure at 6 mg/m$^2$ based on $AUC_{inf}$ in male and female rats, respectively). Males were dosed 28 days prior to and during mating until necropsy (approximately 60 days). Females were dosed for 14 days prior to and during mating until Gestation Day 7.

**Geriatric Use** Approximately 90% of the patients treated with VISUDYNE* in the clinical efficacy trials were over the age of 65. A reduced treatment effect was seen with increasing age.

**Fluorescein Angiography** Standard precautions for fluorescein angiography should be observed. Certain medical conditions (such as pregnancy or allergy to fluorescein) may make the injection of fluorescein dye for a particular patient inadvisable in the opinion of the ophthalmologist. Approximately 1/225,000 patients may experience a severe reaction resulting in a heart attack, stroke, or death. Most reactions are mild, such as temporary nausea or vomiting in a few patients and a rash, hives, or wheezing in about 1%.

**Effects on ability to drive and use machines** Following Visudyne* Therapy, patients may develop transient visual disturbances such as abnormal vision, vision decrease, or visual field defects that may interfere with their ability to drive or use machines. Patients should be advised to not drive or use machines as long as these symptoms persist.

**ADVERSE REACTIONS** In randomized clinical trials in choroidal neovascularization, mainly in patients with age-related macular degeneration (AMD), the most frequently reported adverse events to VISUDYNE* (verteporfin) are injection site reactions (including pain, edema, inflammation, extravasation, rashes, and less commonly, hemorrhage and discoloration) and visual disturbances (including blurred vision, flashes of light, decreased visual acuity and visual field defects such as grey or dark haloes, scotoma and black spots). These events occurred in approximately 10-30% of patients. The following events, listed by Body System, occurred in 1-10% of patients:

Ocular Treatment Site: Blepharitis, cataracts, conjunctivitis/conjunctival injection, dry eyes, ocular itching, severe vision decrease with or without subretinal or vitreous hemorrhage

| | |
|---|---|
| Body as a Whole: | Asthenia, infusion related pain primarily presenting as back pain, fever, flu syndrome, photosensitivity reactions. |
| Cardiovascular: | Atrial fibrillation, hypertension, peripheral vascular disorder, varicose veins |
| Dermatologic: | Eczema |
| Digestive: | Constipation, nausea |
| Hemic and Lymphatic: | Anemia, white blood cell count decreased, white blood cell count increased |
| Hepatic: | Elevated liver function tests |
| Metabolic/Nutritional: | Albuminuria, creatinine increased |
| Musculoskeletal: | Arthralgia, arthrosis, myasthenia |
| Nervous System: | Hypesthesia, sleep disorder, vertigo |
| Respiratory: | Cough, pharyngitis, pneumonia |
| Special Senses: | Cataracts, decreased hearing, diplopia, lacrimation disorder |
| Urogenital: | Prostatic disorder |

Severe vision decrease, equivalent of 4 lines or more, within 7 days has been reported in 1-4% of patients. At least partial recovery of vision, defined as more than one line improvement of vision following the event, occurred in most patients (approximately 75% of patients).

Photosensitivity reactions usually occurred in the form of skin sunburn following exposure to sunlight during the first 2 days after treatment usually within 24 hours of VISUDYNE* infusion. The higher incidence of back pain in the VISUDYNE* group occurred primarily during infusion and was not associated with any evidence of hemolysis or allergic reaction and usually resolved by the end of the infusion.

The following adverse events have occurred either at low incidence (<1%) during clinical trials or have been reported during the use of VISUDYNE* in clinical practice where these events were reported voluntarily from a population of unknown size and hence the frequency of occurrence cannot be determined precisely. They have been chosen for inclusion based on factors such as seriousness, frequency of reporting, possible causal connection to VISUDYNE*, or a combination of these factors:

Ocular Treatment Site: Retinal detachment (nonrhegmatogenous), retinal or choroidal vessel nonperfusion, severe vision decrease with retinal hemorrhage.

Nonocular Events: Chest and back pain (which may radiate to other areas including but not limited to pelvis, shoulder, girdle or rib cage) and other musculoskeletal pain during infusion.

Vaso-vagal and hypersensitivity reactions can occur, which on rare occasions can be severe. General symptoms can include headache, malaise, syncope, sweating, dizziness, rash, urticaria, pruritus, dyspnea, flushing and changes in blood pressure or heart rate.

Adverse reactions reported in treated eyes in patients with pathologic myopia or presumed ocular histoplasmosis were similar to those reported in AMD patients.

**SYMPTOMS AND TREATMENT OF OVERDOSAGE** Overdose of drug and/or light in the treated eye may result in nonperfusion of normal retinal vessels with the possibility of severe decrease in vision that could be permanent. An overdose of drug will also result in the prolongation of the period during which the patient remains photosensitive to bright light. In such cases, it is recommended to extend the photosensitivity precautions for a time proportional to the overdose.

**DOSAGE AND ADMINISTRATION** A course of Visudyne* Therapy is a two-step process requiring administration of both drug and light. The first step is the intravenous infusion of VISUDYNE* (verteporfin). The second step is the activation of VISUDYNE* with light from a nonthermal diode laser. The physician should re-evaluate the patient every 3 months and if choroidal neovascular leakage is detected on fluorescein angiography, therapy should be repeated.

**Lesion Size Determination** The greatest linear dimension (GLD) of the lesion is estimated by fluorescein angiography and color fundus photography. All classic and occult CNV, blood and/or blocked fluorescence, and any serous detachments of the retinal pigment epithelium should be included for this measurement. Fundus cameras with magnification within the range of 2.4-2.6X are recommended. The GLD of the lesion on the fluorescein angiogram must be corrected for the magnification of the fundus camera to obtain the GLD of the lesion on the retina.

**Spot Size Determination** The treatment spot size should be 1000 microns larger than the GLD of the lesion on the retina to allow a 500 micron border, ensuring full coverage of the lesion. The maximum spot size used in the clinical trials was 6400 microns. The nasal edge of the treatment spot must be positioned at least 200 microns from the temporal edge of the optic disc, even if this will result in lack of photoactivation of CNV within 200 microns of the optic nerve. For treatment of lesions that are larger than the maximum treatment spot size, apply the light to the greatest possible area of active lesion.

**VISUDYNE* Administration** VISUDYNE* should be reconstituted according to the directions given under PHARMACEUTICAL INFORMATION, Reconstitution. The volume of reconstituted VISUDYNE* required to achieve the desired dose of 6 mg/m$^2$ body surface area is withdrawn from the vial and diluted with 5% Dextrose for Injection to a total infusion volume of 30 mL. The full infusion volume is administered intravenously over 10 minutes at a rate of 3 mL/minute, using an appropriate syringe pump and in-line filter. The clinical studies were conducted using a standard infusion line filter of 1.2 microns. Precautions should be taken to prevent extravasation at the injection site. If extravasation occurs, protect the site from light (see Precautions).

**Light Administration** Initiate 689 nm wavelength laser light delivery to the patient 15 minutes after the start of the 10-minute infusion with VISUDYNE*. Photoactivation of VISUDYNE* is controlled by the total light dose delivered. In the treatment of choroidal neovascularization, the recommended light dose is 50 J/cm$^2$ of neovascular lesion administered at an intensity of 600 mW/cm$^2$ . This dose is administered over 83 seconds. Light dose, light intensity, ophthalmic lens magnification factor and zoom lens setting are important parameters for the appropriate delivery of light to the predetermined treatment spot. Follow the laser system manuals for procedure set up and operation. The laser system must be acceptable for the delivery of a stable power output at a wavelength of 689±3 nm. Light is delivered to the retina as a single circular spot via a fiber optic and a slit lamp, using a suitable ophthalmic magnification lens. The following laser systems have been tested for compatibility with VISUDYNE* and are acceptable for the delivery of a stable power output at a wavelength of 689±3 nm:

Lumenis Opal Photoactivator laser console and modified LaserLink adapter, Manufactured by Lumenis, Inc., Santa Clara, CA

Zeiss VISULAS 690s laser and VISULINK PDT adapter, Manufactured by Carl Zeiss, Inc., Thornwood, NY.

**Concurrent Bilateral Treatment** The controlled trials only allowed treatment of one eye per patient. In patients who present with eligible lesions in both eyes, physicians should evaluate the potential benefits and risks of treating both eyes concurrently. If the patient has already received previous Visudyne* Therapy in one eye with an acceptable safety profile, both eyes can be treated concurrently after a single administration of VISUDYNE*. The more aggressive lesion should be treated first, at 15 minutes after the start of infusion. Immediately at the end of light application to the first eye, the laser settings should be adjusted to introduce the treatment parameters for the second eye, with the same light dose and intensity as for the first eye, starting no later than 20 minutes from the start of infusion. In patients who present for the first time with eligible lesions in both eyes without prior Visudyne* Therapy, it is prudent to treat only one eye (the most aggressive lesion) at the first course. One week after the first course, if no significant safety issues were identified, the second eye can be treated using the same treatment regimen after a second VISUDYNE* infusion. Approximately 3 months later, both eyes can be evaluated and concurrent treatment following a new VISUDYNE* infusion can be started if both lesions still show evidence of leakage.

**AVAILABILITY OF DOSAGE FORMS** VISUDYNE* (verteporfin) is supplied in a single-use glass vial with a gray bromobutyl stopper and aluminium flip-off cap. It contains a lyophilized cake with 15 mg verteporfin. The product is intended for intravenous injection only.

Product monograph available upon request. September 2004.

QLT Inc. Vancouver Canada V5T 4T5

Co-developed and distributed by:

NOVARTIS OPHTHALMICS

Novartis Ophthalmics, Novartis Pharmaceuticals Canada Inc. Mississauga, ON L5N 2X7

* Visudyne is a registered trademark

References:

1. Treatment of Age-Related Macular Degeneration With Photodynamic Therapy (TAP) Study Group. Photodynamic Therapy of Subfoveal Choroidal Neovascularization in Age-Related Macular Degeneration with Verteporfin. TAP Report 2. Arch Ophthalmol 2001;119:198-207

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than 2 pd) at distance and esophoria (less than 2 pd) at near. Worth 4 Dot testing showed flat fusion at both distance and near. There was no appreciation of stereopsis, by Titmus Stereofly or Randot tests. Diplopia was reported immediately during vergence testing, indicating severely reduced motor fusion.

❹ *Motor Fusion therapy*

Convergence and divergence ranges must be adequate to ensure stable ocular alignment and normal binocular integration. Vectograms are an ideal tool to train base in and base out ranges, while providing suppression feedback and a stereoscopic target. Unfortunately, C.W. was unable to maintain fusion with this procedure, and found it frustrating. Instead, a motor fusion demand was added to the Polaroid Bar Reader exercise, by adding a 4 pd Base In prism over the right eye. Again, 20-30 minutes of therapy per day was recommended.

Follow-up was in one month. Visual acuity, Worth 4 Dot and cover test results were consistent with the previous visit. However, gross stereopsis (400 seconds of arc) was appreciated for the first time. Vectograms again were demonstrated, and C.W. was able to maintain fusion with effort. Motor fusion training continues using mini-vectograms at this time.

The perception of gross stereopsis is an encouraging development, and indicates a favourable prognosis for continued improvement. C.W. recognizes that his vision is better, and has shown new interest in books with three-dimensional pictures.

❺ *Foveal Sensory Fusion*

The final stage of vision therapy will be to enhance foveal sensory fusion (stereopsis). This may be accomplished through repetitive viewing of three-dimensional images, using the ViewMaster 3D Viewer and non-variable Tranaglyphs.

C.W. and his parents are willing to continue with vision therapy, in view of the progress thus far. It is anticipated that several months of therapy will be required, to achieve near-normal vergence ranges and further enhancement of stereopsis.

(*See References on page 88*)

## Ésotropie

de la page 61

Le diagnostic est une ésotropie accommodative à la suite d'une hypermétropie et un rapport AC/A élevé.

L'ésotropie a été correctement neutralisée grâce aux lunettes correctives bifocales actuelles. L'ésophorie avec fusion au deuxième degré (fusion à plat) a été réalisée de près grâce à la correction. Il reste une ésotropie à petit angle à distance. L'aspect esthétique était bon. Beaucoup de cliniciens s'entendraient pour dire que ce niveau de correction est suffisant et qu'il est fort peu probable que la vision binoculaire s'améliore à cet âge.

Toutefois, il est possible d'améliorer la vision binoculaire grâce à une thérapie visuelle avec motivation et conseils adéquats. On a jugé que C.W. était un garçon de sept ans suffisamment mature pour collaborer et ses parents étaient extrêmement impatients d'entreprendre toute thérapie qui pourrait améliorer la vision stéréoscopique.

Un programme de thérapie visuelle à domicile a été élaboré :

❶ *Correction visuelle*

La réfraction cycloplégique a indiqué une augmentation de l'hypermétropie à l'œil droit. Elle a été jugée importante et on a recommandé une nouvelle prescription des lunettes pour favoriser un alignement oculaire plus précis. Aucune modification de la correction du proximum n'a été recommandée puisque cela aurait gêné la distance de travail de près. On n'a pas recommandé un prisme de réduction (2 dp de convergence OD) puisqu'il n'y a eu aucune amélioration de la fusion lors de l'essai. La correction finale des lunettes à port permanent était de :

| | | |
|---|---|---|
| OD | +3,25 – 1,50 x 001 | +3,25 Ajout (ST 28) |
| OS | +2,50 – 1,00 x 178 | +3,25 Ajout (ST 28) |

❷ *Traitement anti-suppression*

Le traitement anti-suppression a débuté de près, afin de montrer à l'enfant à être conscient de la fixation dans la vision binoculaire. On a montré à C.W.

comment utiliser le gril de Javal de Polaroid et il a réussi à lire sans suppression, mais avec un peu d'effort. On lui a également montré d'autres procédures de traitement plus actives pour éliminer la suppression. C.W. était incapable de comprendre le concept de diplopie physiologique inhérente à l'exercice des billes sur fil. Il était également incapable de percevoir des cibles anaglyphiques (images rouges et vertes, Lego, crayons) à travers des vitres rouges-vertes. Le traitement anti-suppression s'est donc limité à la barre de lecture Polaroid pendant 20 à 30 minutes par jour pour le premier mois de traitement.

❸ *Traitement de la fonction visuelle monoculaire*

Dans des cas de strabisme et d'amblyopie, l'œil non dominant peut laisser apparaître des lacunes dans l'accommodation et la motilité (saccades, poursuites), même après une amélioration de l'acuité visuelle et de l'alignement oculaire. Des procédures de traitement de la vision comme le Hart Chart, les lentilles à combinaison multiple, les repérages visuels et la poursuite oculaire sont efficaces pour améliorer la fonction visuelle monoculaire. On ne les a pas prescrites à C.W. puisque l'accommodation et les poursuites monoculaires se situaient dans les limites normales lors de la première visite.

Après avoir porté ses nouvelles lunettes pendant un mois et avoir pratiqué le traitement anti-suppression quotidiennement, C.W. s'est présenté pour une réévaluation. L'acuité visuelle aidée était de 20/20 pour chaque œil à distance et de près. Le test à l'écran montrait une ésotropie à l'œil droit intermittente (moins de 2 dp) à distance et une ésophorie (moins de 2 dp) de près. Le test de Worth 4 Dot a montré une fusion à plat de près et de loin. Il n'y a eu aucune évaluation de la vision stéréoscopique par stéréotests Titmus ou Randot. Le test de vergence a immédiatement révélé la diplopie en indiquant une diminution grave de la fusion motrice.

❹ *Traitement de la fusion motrice*

Les degrés de divergence et de convergence doivent être adéquats pour garantir un alignement oculaire stable et une intégration normale de la vision binoculaire. Les vectogrammes sont un outil idéal pour former les degrés de divergence et de convergence tout en fournissant un retour de suppression et une cible stéréoscopique. Malheureusement, C.W. était incapable de maintenir la fusion avec cette procédure qu'il trouvait frustrante. Au lieu de cela, on a ajouté une demande de fusion motrice à la barre de lecture Polaroid, en plus d'un prisme de divergence de 4 dp sur l'œil droit. On a également suggéré un traitement quotidien de 20 à 30 minutes.

Le suivi a eu lieu après un mois de traitement. Les résultats de l'acuité visuelle, du test de Worth 4 Dot et du test à l'écran se sont révélés conformes à ceux de la visite précédente. Toutefois, on a évalué pour la première fois la vision stéréoscopique grossière (400 secondes d'arc). On a encore utilisé des vectogrammes et C.W. a été capable de maintenir la fusion avec effort. On continue l'entraînement à la fusion motrice en utilisant cette fois-ci des mini-vectogrammes.

La perception de la vision stéréoscopique grossière est un développement prometteur qui indique un pronostic favorable pour une amélioration continue. C.W. reconnaît que sa vue est meilleure et il trouve un nouvel intérêt dans les livres renfermant des images tridimensionnelles.

❺ *Fusion sensorielle fovéale*

La dernière étape de l'entraînement visuel consistera à améliorer la fusion sensorielle fovéale (stéréopsie). On peut accomplir cela grâce au visionnement répétitif d'images tridimensionnelles au moyen de la visionneuse 3D de ViewMaster et de « tranaglyphes » invariables.

Compte tenu des progrès réalisés jusqu'à maintenant, C.W. et ses parents désirent continuer la thérapie visuelle. Plusieurs mois de traitement seront nécessaires pour atteindre des niveaux de vergence à peu près normaux et une nouvelle amélioration de la stéréopsie.

## References

Coloroso E.E., Rouse M.W. Clinical Management of Strabismus. Butterworth-Heinemann. Boston. 1993. pp. 159-173, 249-276, 295-351.