

# Essential topical ocular diagnostic drugs for the family practitioner

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## Introduction

The drugs discussed in this section are essential in executing a basic eye examination and assessing certain ocular complaints commonly encountered by the primary care physician. Three very commonly used diagnostic drugs in basic eye examinations are fluorescein dye, local anaesthetics and mydriatic drugs. Practical aspects of these agents are discussed. Before administering any topical medication, always attempt to get a drug allergy history.

## Management

### Fluorescein dye

Sodium fluorescein is a water-soluble, *orange-yellow* dye that becomes a brilliant *green* when viewed under cobalt-blue or fluorescent light. This light source is available on any modern ophthalmoscope set. The dye, which does not irritate the eye, is extremely helpful in detecting abrasions of the corneal surface because fluorescein stains damaged epithelium.

To instill the dye, a sterile, individually packaged dry fluorescein strip is moistened with a drop of sterile saline or water or even with the patient's own tears and applied to the inferior fornix. Sterile *minims* containing the dye in solution form

may also be used. Always be aware that the minims are preservative free and because fluorescein is a growth medium for bacteria, once opened the container should be discarded within 24 hours. A few blinks spread the now-visible tear film across the cornea. No systemic complications accompany the use of topical fluorescein, but soft contact lenses may be permanently stained because of its porous structure. This may be avoided by first removing contact lenses before instillation of the dye.

Fluorescein dye is indispensable for the detection of corneal conditions such as abrasions, ulcers, herpetic disease, contact lens overwear and dry eye syndrome.

### Anaesthetics

Among the topical anaesthetics, the most widely used agents are proparacaine hydrochloride 0.5%, benoxinate 0.5% and tetracaine 0.5%. The instillation of 1 drop of these surface-active compounds renders the corneal epithelium insensate within 15 seconds. Reapplication will enhance the anaesthetic effect. Such anaesthesia is useful to make surface manipulations painless such as removal of corneal or conjunctival foreign bodies, performing tonometry or giving a subconjunctival injection. Use of an anaesthetic also facilitates the examination of a dam-

aged cornea which otherwise might be difficult because of the pain and accompanying blefarospasm. Patients should be advised not to rub their eyes after receiving such drops to prevent them from inadvertently scratching their corneas.

Never prescribe topical anaesthetics for repeated use by patients because they are toxic to the corneal epithelium; they inhibit mitosis and cellular migration and can lead to corneal ulceration and permanent corneal scarring.

### Mydriatics

Mydriatics are drugs that dilate the pupil; dilation may be necessary for proper ophthalmoscopy.

Before they may be used safely the depth of the anterior chamber needs to be assessed in order to prevent the precipitation of acute angle glaucoma in predisposed eyes. The easiest way to help assess the anterior chamber depth is by means of the **Iris Eclipse Test**. This test is best performed by using a side illumination (e.g. a pocket torch or an ophthalmoscope light) from the temporal aspect of the iris and observing the presence or absence of a shadow on the nasal iris surface. Should a shadow be observed, caution should be taken in dilating the eye.

**Mydriatics can be divided into two classes:**

1. Parasympatholytic or cholinergic-blocking drugs, and
2. Sympathomimetic or adrenergic-stimulating drugs.

**Parasympatholytic drugs**

Drugs in this category dilate the pupil by paralysing the iris sphincter. Several such drugs are in regular use and they differ as far as their duration of effect is concerned:

1. Tropicamide 0.5% – effect lasts 4-8 hours
2. Cyclopentolate hydrochloride 0.5% – effect lasts 12-18 hours
3. Homatropine hydrobromide 1% or 2% – effect lasts 1-2 days
4. Atropine sulphate 0.5% – effect lasts 7 to 14 days

These drugs not only produce mydriasis but also paralysis of the muscles of the ciliary body and for this reason they are often referred to as *cycloplegics* (causing paralysis of the ciliary body). The result of this is that the accommodation ability is impaired and therefore the patient's near vision is blurred. This effect wears off depending on the duration of action of the cycloplegic used. The widely dilated pupil may also render the patient photophobic (light sensitive) hence patients may elect to wear darkened spectacles whilst outside in bright light.

**Tropicamide** is a popular mydriatic with primary care physicians and ophthalmologists alike because of its rapid onset and short duration of action. Remember that maximum effect is only attained about 30 minutes after instillation.

**Sympathomimetic drugs**

These drugs dilate the pupil by stim-

ulating the pupillary dilator muscle.

Only one such drug is in regular use: *Phenylephrine hydrochloride* 2.5%. Just one drop applied to the eye dilates the pupil in 30-40 minutes, but has very little effect on accommodation; thus, phenylephrine is a mydriatic but not an effective cycloplegic. The mydriasis produced is not as great as with tropicamide, and the pupil remains reactive to light. For these reasons phenylephrine is seldom used alone as a mydriatic.

When maximum mydriasis is required *phenylephrine hydrochloride* 2.5% may be combined with tropicamide or cyclopentolate because the effects are additive. One such combination which is clinically very useful is cyclopentolate HCL 0.2% and phenylephrine HCL 1.0% (*Cyclomydril®*).

As with all sympathomimetics care should be taken when using

them in patients with hypertension and coronary vascular disease. These side-effects are, however, very rare when the above concentrations are used.

In infants *Cyclomydril®* is the safest and most effective agent.✚

**See CPD Questionnaire p.50**

**References**

1. Kanski JJ. *Clinical Ophthalmology – A Systematic Approach*. 3<sup>rd</sup> Edition. Butterworth-Heinemann: Oxford, 1994: 255-256, 273-277.
2. Bradford CA. *Basic Ophthalmology for Medical Students and Primary Care residents*. 7<sup>th</sup> edition American Academy of Ophthalmology, 1999.

**Note:**

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