This handout describes chemical perfusion treatment for patients with Meniere’s disease, sensorineural hearing loss, and autoimmune inner ear disease. In some cases, injections may be used for tinnitus (ringing of the ears). How the treatment works, the treatment methods, expected results, and possible side effects or risks are discussed.

**Conditions Treated with Chemical Perfusion**

The topical application of medication directly onto the inner ear by an injection through the eardrum (transtympanic) has application in the management of Meniere’s disease, sudden sensorineural hearing loss, and autoimmune inner ear disease (AIED).

**Meniere’s Disease**

The vertigo caused by Meniere’s disease may be treated by medication and dietary salt restrictions. Diuretics are often prescribed and, in many cases, this management is sufficient to control the patient’s symptoms. However, some people continue to have disabling symptoms in spite of medical therapy.

In the past, surgery has been the only solution. More recently, the treatment option of chemical perfusion – where the inner ear is directly injected with medication – provides a new alternative to more invasive procedures, with less surgical risk.

**Sudden Sensorineural Hearing Loss and AIED**

Sudden sensorineural hearing loss is a condition in which uncertainty about the true cause of the disease makes the development of effective treatments difficult. AIED results when the patient’s immune system identifies an inner ear protein as a foreign substance. This causes inflammation and damage to the hearing and balance organs.

Of the medical approaches for sudden sensorineural hearing loss of unknown cause and AIED, treatment with steroid pills is traditional. This treatment works by reducing the inflammation. Unfortunately, steroids in pill form can have bad side effects and are not advised in
patients with other diseases such as diabetes and peptic ulcer. As in Meniere’s disease, the direct application of medication to the inner ear now offers patients an alternative to steroid treatment in pill form.

**Chemical Perfusion Treatment**

The idea behind transtympanic medication is that a stronger dose of drug can be delivered to the affected ear. In contrast to medications by mouth or through the vein, the drug does not need to be distributed throughout the whole body before getting to the ear. For the same reason, the drug is not reduced in strength before it affects the ear. Direct application of the medication is less likely to have total body side effects, and smaller amounts of the drug can be used.

Gentamicin is used to treat patients with Meniere’s disease. It is an antibiotic that is commonly given through the veins to treat serious infections. In addition to killing bacteria, it is also known to reduce or eliminate the function of the inner ear balance organ. When the inner ear is treated with small amounts of gentamicin, we can take advantage of this effect to stop the sensory cells in the inner ear from causing dizziness.

The steroid dexamethasone is a drug that is commonly used to treat sudden sensorineural hearing loss and AIED. It has a strong ability to decrease inflammation. When used in small doses to treat the cochlea, the drug is intended to decrease the inflammation within the cochlea. This may result in stabilization or recovery of hearing and the improvement of balance problems when present. Injections may also be indicated in selected cases of ringing of the ears (tinnitus).

The gentamicin and steroid solutions used in this clinic are prepared in the UWMC pharmacy in strengths shown to work in patient studies. The medications may be administered two ways. The easiest way is through a tiny needle hole to the eardrum. This can be done in the clinic after a small amount of numbing medicine is applied directly to the eardrum. If many injections of either drug are required, a small ear tube can also be put in through a small incision to the eardrum. One or more injections of the drug may be needed to achieve the desired results.

In the case of sudden sensorineural hearing loss and AIED, the goal of therapy is stabilization or recovery of hearing. Because all patients are different, the number of injections of medication will vary and must be individualized to meet each patient’s needs. The surgeon will talk with you about the treatment course that will be followed in your case.
Treatment Results

When used to treat the vertigo of Meniere’s disease, the success of transtympanic perfusion with gentamicin has been reported to be between 80 to 90%, although relapses may occur. In 85 to 95% of cases, the procedure spares the hearing. The risk to hearing may be greater depending on the amount of drug that is needed to control the vertigo.

Transtympanic administration of dexamethasone has been reported to recover hearing in over 40% of patients who failed to respond to giving the drug by mouth. These results are most encouraging and represent a significant incidence of hearing salvage in patients who otherwise would have been considered treatment failures. The effectiveness of direct application of dexamethasone used to manage AIED hearing loss is still being studied.

Potential Risks of Therapy

In general, the risks of cochlear perfusion with either gentamicin or dexamethasone are low and the drugs are well-tolerated. The risks and complications of the tiny eardrum hole are the same as for tubes.

As with any surgery, pain, bleeding, infection, and drainage can occur. If a tube is placed, it usually falls out within a matter of weeks and the hole will close on its own. In rare cases, the hole may persist and require surgical closure.

Patients are advised not to drive or operate heavy machinery for up to 6 hours after the injection. In the case of gentamicin therapy, hearing is generally unaffected or may deteriorate. Tinnitus (ringing in the ears) is also generally not affected but could potentially increase in intensity if hearing loss results. The instance of hearing loss is usually no greater than 10 to 15%, but may be as high as 40% in some studies. The risk of such outcome depends on how much medication is used but may influence your decision to proceed with therapy.