Medical research is a continuum that spans diverse realms of laboratory research and several kinds of clinical research. The major research findings benefit the public in the form of new diagnostic instruments, new treatment, and new prevention strategies. Clinical research is a crucial element in this endeavour.

What is clinical research?

Clinical research refers to research conducted with human beings, including studies of specimens collected from specific patients. It encompasses some laboratory research on the mechanisms of human disease, translational research (in which laboratory and clinical activities are closely aligned), clinical trials of preventive and therapeutic strategies, epidemiology, behavioural research, and health services and outcomes research. Because it covers so many topics, in clinical research the skills and expertise of individuals Whose Primary training is in medicine involves clinical teaching and research (so-called "Clinician Scientists") is important.

Why do we need clinical research?

Clinical research shows us what works (and what doesn't) in medicine. They are the best way doctors have found to learn what works best in treating various diseases. Clinical researches are designed to answer 2 important questions:

- Does the new treatment work in humans? If it does, doctors are also looking for how well it works. Is it better than what's now being used to treat a certain disease? If it's not better, is it at least as good, perhaps while causing fewer side effects? Or does it work in some people who aren't helped by current treatments? In other words, is it a step forward? A treatment that doesn't offer anything new probably isn't worth studying.

- Is the new treatment safe? This must be answered while realizing that no treatment or procedure -- even one already in common use -- is entirely without risk. But do the benefits of the new treatment outweigh the possible risks?

Clinical research answers these questions and gives more accurate and scientific answers with reducing the risk to as few people as possible to an unknown treatment. The same new treatment if started without research can be dangerous.

Current Research

What research is being done?

A large amount of research is being done in the U.S and other countries including India to learn what causes glaucoma and to improve its diagnosis and treatment. For instance, the National Eye Institute (NEI) is funding a number of studies to find out what causes fluid pressure to increase in the eye. By learning more about

this process, doctors may be able to find the exact cause of the disease and learn better how to prevent and treat it. Various NGOs and government agencies also supports clinical trials of new drugs and surgical techniques that show promise against glaucoma.

New Research for future of glaucoma

1. The Retinal Ganglion Cell Survives Longer Than Previously Thought

The retinal ganglion cell is primary cell that's affected in glaucoma, does not die early in the stages of the disease. Its death is quite delayed in the disease process. There are many changes in that retinal ganglion cell that are akin to what you see in other neurodegenerative diseases. The progressive degenerative process is very slow. It has been discovered that early changes in the ganglion cell undergo a degenerative process long before the cell itself begins to die. Some of the newer research suggests that other cells in the retina are equally affected or equally contribute to the rate and decline of the ganglion cells. This is exciting because it gives us other targets to intervene. These other cell types are very important in the function and support of the ganglion cell. The newer research shows that there may be "master programs" for degeneration. Because it's a master program, there has to be a coordinator. Once we can find the coordinator of all these systems, we should be able to intervene and "turn off" that program.

2. New Glaucoma Drugs

A new class of glaucoma drugs promises to act specifically on the eye's drainage canals, called the trabecular meshwork, a main outflow and blockage site in glaucoma. Rho kinase (ROCK) inhibitors target cells in the trabecular meshwork to enhance aqueous humor outflow. Aqueous humor is a clear fluid that maintains the intraocular pressure.

In research models of glaucoma, ROCK inhibitors have been shown to reduce cellular "stiffness" and enhance outflow through the trabecular meshwork, thereby reducing IOP. This is a novel and unique target and approach to lowering IOP. Research data has shown that ROCK inhibition has the potential to offer neuroprotective and anti-inflammatory effects as well as enhance blood flow to the optic nerve, all of which could benefit glaucoma patients. The glaucoma community looks forward to and awaits the clinical research data as it becomes available for this potentially exciting class of drug compounds.

3. Three Surgical Alternatives

Several new surgical approaches have been developed in an effort to reduce complications associated with conventional glaucoma surgery. Each approach exploits a specific strategy to reduce the pressure within the eye.

- The **Ex-Press mini-shunt** can be used with conventional trabeculectomy techniques to standardize the operation and perhaps reduce the chances of the eye pressure getting too low in the immediate post-operative period, which is occasionally a problem with conventional approaches.
- The **Trabectome** device removes tissue from the drain inside they eye (the trabecular meshwork) using an electro-surgical handpiece that disrupts the tissue.
- **Canaloplasty** involves the dilation of the entrance to the outflow pathways in the wall of the eye (Schlem's canal) in addition to constructing an artificial fluid outflow mechanism within the eye wall to reduce the pressure in the eye.

While each of these techniques has potential advantages, there are limited data to support long-term efficacy and even less data that is not derived from studies directly supported by the companies that develop these products.

At the current time the clear indications for these procedures are still being determined. Many questions remain as to how these approaches should best be utilized in the treatment of glaucoma.

Is it right for you?

It is important to recognize that the long-term effectiveness of these approaches is not yet known. Conventional surgery such as trabeculectomy continues to be an acceptable and appropriate option especially in patients with advanced disease.

Important questions to ask your physician about a new surgical procedure would be:

1. the number of these procedures they have performed,
2. their success rate with the procedure, and
3. if they have any financial conflicts with these emerging technologies.