

# Amar Sawhney, PhD

Currently the president and CEO of Ocular Therapeutix, Dr. Sawhney invented hydrogels with broad applicability in medicine.



## What is your background?

I received my bachelor's degree in chemical engineering at India Institute of Technology in New Delhi, and I came to the University of Texas (UT) at Austin in 1987 to pursue my MS and PhD. While I was at UT, my faculty advisor, a postdoctoral fellow, and I invented hydrogels that were polymerized by light. This was the first time that chemical reactions to form materials could be done in contact with living tissue with no harm. The hydrogels had broad applicability, and two companies were founded based on this development. I joined one of these, Focal, in Cambridge, Massachusetts, as the first employee and technology founder; the company eventually went public in 1997. Because I was not able to gain access to this technology for other applications, I left and invented new hydrogel technology that was not based on light activation. This technology formed the basis of the material used for the ReSure Sealant (Ocular Therapeutix).

Prior to developing the sealant, I used the hydrogel to create a number of surgical sealants for various parts of the body, including the dura and spine (Confluent Surgical, acquired by Covidien), the lung (Focal, acquired by Genzyme), and femoral puncture (Access Closure, acquired by Cardinal Health). Other products using my technology include a hernia mesh marketed by CR Bard, breast biopsy markers by Devicor, biopsy track sealants by Angiotech, abdominal aneurysm stent grafts by Endologix, and spacers and fiducial markers for radiation oncology by Augmenix. More than 3 million patients have been treated with these devices during the past several years.

## What got you interested in hydrogel technology?

Owing to their high water content, hydrogels are able to mimic the body's natural tissues to protect them during the healing process. This effect can be achieved without a chemical reaction to the tissues

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but rather by a process of polymerization over the tissues. In some instances, the body's natural fluids can be used to form the hydrogel inside the body. The body breaks down hydrogels over time and flushes them through the kidneys. In the future, long-term implants may never need to be removed. The process of in situ formation allows the hydrogel to travel through fine channels, catheters, sprayers, etc., to remote locations within the body. There, hydrogels can form customized implants that may serve as temporary scaffolds for healing or deliver drugs to treat local or systemic diseases. The applications of this technology are truly from head to toe. To allow this science to blossom, my partner, Fred Khosravi, and I have created Incept, an “enabler” of medical advancements that continues to found companies in new areas with technology to which we and others contribute.

## How did you end up in the ophthalmology space?

While I was at Confluent, I was approached on several occasions by ophthalmologists about the possibility of using our hydrogel technology for ophthalmic applications. Because surgeons were using fibrin glues and cyanoacrylates off label to seal incisions, there was an obvious need in the marketplace for an FDA-approved ophthalmic sealant that was comfortable and safe for the patient. Once we started Ocular Therapeutix, it became clear that a significant need

existed for local drug delivery to the eye, and this has become an important area of focus for us.

### **What are you working on currently?**

Due to the flexibility of our technology, we have the ability to encapsulate pharmaceuticals within the hydrogel to sustain their release over time. In addition, we are able to program the length of the release and its rate over time. We are thus able to tailor therapy to a particular disease state. We are presently conducting clinical trials for a dexamethasone-eluting punctal plug for the resolution of postoperative inflammation and pain and travoprost-eluting punctal plugs for reducing IOP in patients with glaucoma or ocular hypertension. Finally, we are in preclinical stages of encapsulating biologics into our hydrogel to we hope, treat posterior segment diseases such as age-related macular degeneration and diabetic macular edema.

### **Of which accomplishments are you the proudest?**

More than anything, it is extremely rewarding when I hear from physicians that I have helped improve outcomes for their patients or from the patients themselves. The success of hydrogel technology has allowed me to pursue philanthropic activities that are dear to me in areas of education and wildlife conservation. Through my family foundation, I support various efforts and have worked directly to highlight the plight of leopards in India, where the animals are increasingly coming into contact with human habitation. Recently, the White House awarded me the Champions of Change and the Outstanding American by Choice awards, which was nice recognition.

### **How do your other interests tie into your work, and how do these interests keep you grounded?**

I have the privilege of mentoring several young entrepreneurs in their ventures. I am constantly amazed by the creativity and drive that some of these young people have, and it makes me thankful that I can still make a living in a world filled with such talent. Being a Sikh has a profound influence on my life: it has allowed me to be open and forthright about all that I do. Sikhism teaches one to make a living from honest, hard work and holds that one should share with others. I not only try to abide by these philosophies, but I use them to be a role model for the community. My wife, Deepika, and children, Anhad (11) and Pria (9), certainly keep me grounded as well. ■