

ERGOJECT™

TODAY'S WAY TO INJECT IOLs

Interview with Medical's CEO Volker Dockhorn on the launch of the new state-of-the-art ERGOJECT injector

In April 2017, you presented the ERGOJECT at the ASCRS in San Diego for the first time. Does Ophthalmology really need another IOL injector?

It is funny that you ask this first. Surgeons who supported us during the design phase asked the very same question when we first approached them. Another injector? What can you do differently to the ones on the market?

That is exactly what I would like to know.

There have always been two worlds of IOL injection systems. The one where surgeons prefer to use one hand for injection and have the other free for manipulations and therefore use the classic syringe-type injector. And then there is the other world where surgeons want absolute control over the lens, the advancing of the lens and the injection itself. They prefer using screw-type injectors, which are still the most popular IOL injection systems to this day. Our declared aim was to combine the two worlds. We asked ourselves what a one-handed screw injector could look like. What seemed to be paradox and a contradiction in itself ended eventually in the development of this brand new ERGOJECT injector.



Volker Dockhorn
CEO Medical AG

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How can one picture a one-handed screw injector?

Different from the classical screw injectors, ERGOJECT does not function with a screw thread. Instead, the plunger is advanced



by turning the operating wheel which is connected to a gear drive.

How did you come up with that?

As a Swiss company, one cannot avoid looking at the successful Swiss watch industry. We have taken these famous precision gears as an example and wanted to use them in our IOL injection system. The high precision during movement and the almost powerless transmission was especially important for us.

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What advantage does a gear-driven injector have for the user?

The gear drive works with a quadruple reduction. This means that the power felt is actually only one quarter of the power which was initially invested. It does not matter how quickly or slowly you would like to inject, the lens always follows the surgeon's directions given by turning the operation wheel accordingly.

What is the function of the small lever on the top of the injector?



With this lever, you can block an unintended backward-movement of the injector plunger. If you activate the lever, you can only advance the plunger forward. This makes sense for small incision surgeries,

when the counterforce on the lens increases and the lens is automatically being pushed backwards. In this case, the operation wheel would always turn back when you would like to advance the plunger. This would be very disruptive, and therefore we have added the lever to block the backward movement. As mentioned, this is an especially useful feature for small cartridges such as ERGOJECT 1.6, 1.8 or 2.0. Obviously, the back rotation lock can be deactivated at any stage during the injection again.

Why does the operation wheel need to be turned backwards in order to advance the plunger? It is somewhat illogical.

When you look at it that way, it is indeed illogical. Our first design drafts were designed with an operation wheel to be turned forward in order to advance the plunger. However, we realized quickly that it did not feel right. Anatomically, the hand is constructed to grab and therefore it is more comfortable to pull back with your finger rather than push forward. There is almost no power required. We have therefore decided to turn back the wheel using your index finger instead of pushing the wheel forward. It is simply more ergonomic.

Hence the name ERGOJECT?

Yes exactly. We have not really considered an ergonomic handling on previous products the way we did for this injector. This can be seen on various points. Apart from the pulling direction of the operation wheel, the position is also very important. The operation wheel has been placed as far forward as technically possible, which means that the force applied by the surgeon is closer to the eye, in comparison to syringe-type injectors. For these injectors, the load application is done more than 2cm further away from the eye than ERGOJECT. As a consequence,

this creates a bigger lever arm which leads to nervous motions especially when there are larger forces. The near-to-eye position and handling of the ERGOJECT injector reduces the leverage forces and therefore minimizes the power related movements of the injector.

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Did you have to design the injector this big due to the gear drive?

No, at the very beginning, we designed it to be small and narrow despite the gear drive. The ergonomic aspects, however, played a bigger role in the end. If you press your thumb and middle finger together and then try to pull your index finger backwards, you realize that this is not very comfortable. The tendinous connections in the hand enable the index finger to move freely only when the thumb and middle finger are approximately a finger width apart. This is exactly the reason why we have designed the injector housing to be finger width - so that the injector lies nice and relaxed in your hand.

The line management does not resemble the classical injectors

That's correct. Previously, injectors were designed according to the manufacturability of metal injectors where classical turning and milling geometries were used. Today, state-of-the art injection molding procedures enable completely different geometrics. The front part of the injector has been kept deliberately narrow not to restrict visibility on the eye. The middle part with the operation wheel has an unconventional shield shape which has always guaranteed the stability of all different variations of hand positions in our studies. Additionally, we have added reinforced grooves to increase the grip considerably. The back of the injector is designed to lie stable and without unintended rotation, between thumb and index finger. All of these aspects are ergonomic benefits which for metal injectors would result in enormous expenses and efforts if applied.

Is it difficult for the surgeon to get used to holding the injector like a pen?

We were very anxious at first but thankfully when conducting the clinical tests, it turned out the surgeons only needed a minimum of time to get used to holding the injector like a pen. Most of the surgeons have mentioned

that they are used to holding I/A instruments this way so that it was not completely alien to them. They felt that it was a familiar and comfortable handling of the injector.

Does this bid farewell to the simple syringe -and screw type injectors?

Classic injectors will still be available in the coming years, but ERGOJECT is not just another simple syringe on the market. It is a high-quality surgical instrument which will set completely new standards.

Can one still afford this in today's cost pressure within the health care system?

Absolutely yes. We made sure during the entire development of ERGOJECT that it will not exceed pricing of our current high-end line ACCUJECT. Surgeons therefore get a high-precision, gear unit assisted, ergonomic designed product for the same price she or he paid before.

What about being copied?

For this technology, we have applied for patents and we are confident that they will be granted. Therefore, it can be assumed that Medical will be the exclusive manufacturer of this technology.

Which IOLs can be injected with ERGOJECT?

With almost any one-piece lens. Our cartridge sizes range from 1.6mm up to 3.0mm, depending on the lens and diopter.



Reference: Dr. Florian Sutter
Eyecenter Herisau, Switzerland

No preloaded lenses?

Of course, preloaded lenses as well. ERGOJECT is completely compatible with the preloaded system ACCUJECT PRO. ACCUJECT PRO users of preloaded hydrophilic lenses can easily insert the loading chamber which includes the preloaded lens into the ERGOJECT PRO preloaded injector also. For hydrophobic preloaded lenses, the lens manufacturer provides the preloaded ERGOJECT PRO injector. We are currently speaking with almost all of our customers of preloaded injectors about upgrading to ERGOJECT PRO. I assume that in the near future you will see many preloaded lenses combined with our ERGOJECT injector.

You have mentioned ERGOJECT 1.6. What is the necessary incision and which lens can be injected through such a small incision?

The incision size depends on the applied injection technique, just like for any other injector. When applying docking-technique, incisions of 1.6mm can be used. For wound-assisted techniques, which means that the injector is slightly inserted into the eye but not as far as the capsule, a 1.8mm incision is suitable. Surgeons who prefer inserting the injector deeper into the eye (into-the-bag) can still use a 2.0mm incision only. However, I have also experienced surgeries where cartridge tips were inserted deeply into the eye through a 1.6mm limbal incision. In principal, almost any lens which could be injected through an ACCUJECT 1.8 or VISCOJECT 1.8 can now be injected through a 1.6mm incision. The 1.6 cartridge tip is now a Medical standard and will eventually replace the 1.8 cartridges. The same cartridge tip is also available for ACCUJECT and VISCOJECT-BIO injectors.

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Doesn't the cartridge split this way?

No, although cartridge splits can occur when using the classical cartridges with low cost injectors, this does not apply to our modern cartridges such as ERGOJECT, ACCUJECT and VISCOJECT-BIO models. It is no longer easy to just purchase raw material and produce cartridges. Nowadays, in order to have the outstanding mechanical properties of these cartridges, we have to change the raw material in a technically extensive process within a chemical reactor. In a worst case scenario, the cartridge tip may dent and the lens may get stuck but it will never split and therefore, it cannot result in a critical condition for the patient. With this technology, we are certainly market leaders.

Scan QR code to learn more about Medical's ERGOJECT injection system

