

— The Revolutionary Training System for Phaco and Other Ophthalmic Surgeries —

It's not the time we train ourselves with porcine or human eyes!!



Invented by Junsuke Akura

Clinical Professor of Tottori University
Chairman of Association for Ophthalmic Cooperation in Asia

Co-Invented by Kiran Pokharel

Frontier Vision Co., Ltd.

What is KITARO Surgical Training System ? _____ 2

What is KITARO WetLab ? _____ 4

Components of the Kit and Optional Items _____ 6

Practice Method _____ 10

What is "KITARO" Surgical Training System?

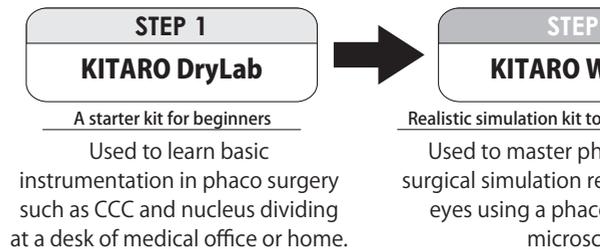
■ **"KITARO" is a revolutionary educational and training system for mastering phaco and other ophthalmic surgeries.**

"KITARO" is a eye surgery training system which has been developed with many innovative technologies (14 PAT and 25 PAT. P. technologies) for teaching and practicing phaco and other ophthalmic surgeries.

The KITARO surgical training system consists of three types of training kits; "KITARO DryLab" and "KITARO WetLab" for learning phaco surgery and the recently developed "KITARO MultiLab" for learning difficult cases in phaco surgery and surgical techniques in various ophthalmic fields.

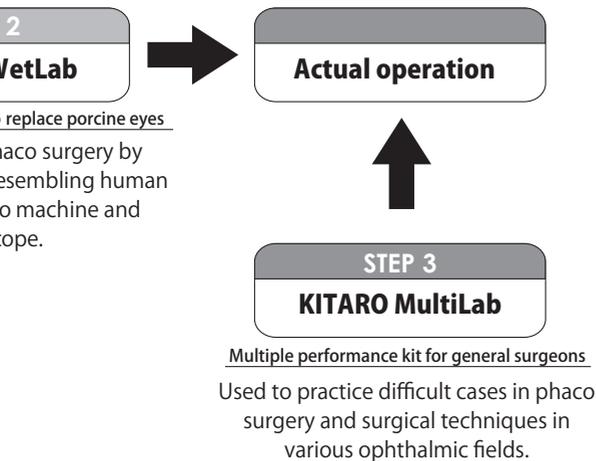
Phaco surgery involves a combination of instrument manipulation by hands and machine operation by foot switches. For beginners, it is very complicated to perform these two operations by hands and feet at the same time in wet lab. We believe that the most effective method to master phaco surgery for beginners is first to learn instrument manipulation with KITARO DryLab, second to learn machine operation with KITARO WetLab, and then perform actual surgeries.

"KITARO" Surgical



Meanwhile, "KITARO MultiLab" has been developed for general surgeons to improve their surgical skills for difficult cases with small pupil, weak zonule, or zonular rupture in phaco surgery as well as secondary IOL implantation (scleral suture fixation, intrascleral fixation), ECCE (standard, sutureless), glaucoma surgery (trabeculectomy, trabeculotomy), corneal transplantation (full-thickness, endothelial), and phakic IOL implantation. "KITARO MultiLab" allows you to practice various ophthalmic surgical techniques not only in inexpensive wet lab room with a surgical microscope but also at the desk at home with a desk top magnifying glass or with the naked eyes.

KITARO Surgical Training System



What is KITARO WetLab?

■ KITARO WetLab is a miracle phaco surgery simulator replacing porcine wet lab.

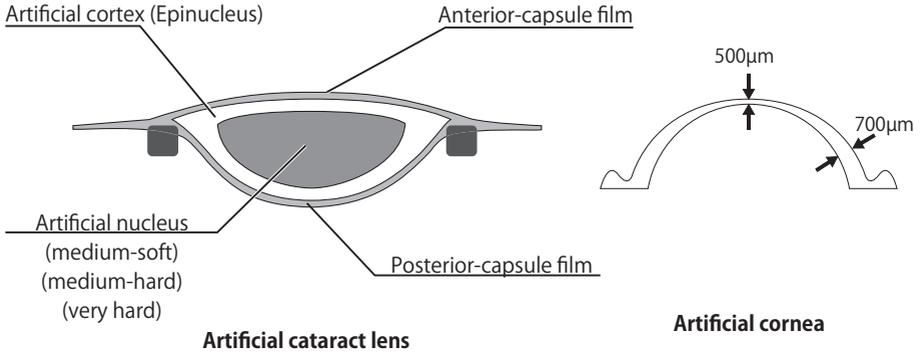
KITARO WetLab is a tool designed to simulate phacoemulsification using a phaco machine under a microscope in an operation room or wet lab, very similarly on the human eye.

KITARO WetLab provides advantages over porcine wet lab in terms of (1) simple preparation (setting the artificial cataract lens preserved in the refrigerator only), (2) hygienic environment (free from virus infection and rot), (3) high quality (useful for practice of CCC and nuclear segmentation which is difficult with porcine eyes), and (4) cost effectiveness (simple preparation results in saving time and manpower costs).

KITARO WetLab is an all-in-one surgical simulator kit having almost everything you need, including the eyeball part which generates eyeball movement during instrumentation, a mask equipped with eyelids as those of a soft as human, mock instruments such as a hook and forceps, irrigation bag (which uses tap water), and a drainage system, all of which require no complicated preparation.



■ The features of KITARO WetLab include a high-quality artificial cataract lens and artificial cornea.



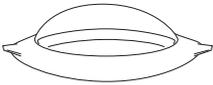
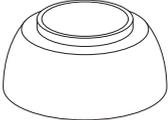
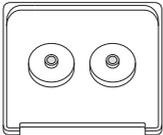
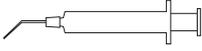
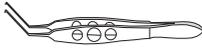
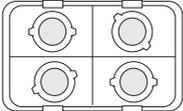
The artificial cataract lens of KITARO consists of the nucleus, cortex, anterior-capsule film, and posterior capsule film and enables practice of almost all steps in phacoemulsification such as CCC, hydro procedures, all nuclear segmentation techniques, emulsification and aspiration of nuclear fragments, epinucleus removal, and IOL insertion. There are 3 types of nuclei varying in hardness (medium-soft, medium-hard, and very hard). In addition, posterior-capsule rupture and nuclear dropping may occur, which allow you to practice intraoperative complication management.

The artificial cornea of KITARO is 500 µm thick at the central part and 700 µm thick at the periphery, generating resistance as when an instrument is inserted and manipulated in the human eye. It also allows practice of self-sealing wound construction, suture, AK (LRI), and so on, as on the human eye.

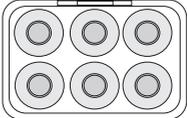
Components of the Kit and Optional Items

Components of the Kit

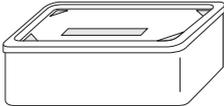
Note: A 6-piece pack of the artificial cataract lenses should be purchased separately. The drainage box must also be purchased, or substitute prepared.

<p>Eyeball Part</p>	<p>① Cornea-iris part for WetLab (This is fixed to the sclera part)</p> 	<p>② Sclera part</p> 
<p>Base Plate & Mask</p>	<p>③ Base plate (with iron balls and sponges)</p> 	<p>④ Mask</p> 
<p>Mock Instruments</p>	<p>⑤ Cystotome with syringe</p>  <p>⑥ Nucleus manipulating hook (with 2 types of tips)</p> <p>Phaco chopper</p>  <p>Spatula hook</p>	<p>⑦ Hydro needle with syringe</p>  <p>⑧ Sclera fixation forceps</p>  <p>⑨ Anterior-capsule forceps</p> 
<p>Irrigation Bag</p>	<p>⑩ Irrigation bag (using tap water)</p> 	
<p>Consumable Items</p>	<p>⑪ 4-piece pack of cornea-iris parts for WetLab</p> 	

Components sold separately

<p>Disposable Items</p>	<p>6-piece pack of artificial cataract lenses: Mixed nucleus pack (3 medium-soft & 3 medium-hard nuclei)</p> 
--------------------------------	--

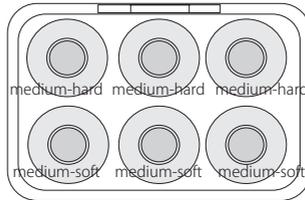
Optional

<p>Drainage system</p>	<p>Drainage box</p> 
<p>Disposable Items</p>	<p>6- or 4-piece pack of artificial cataract lenses:</p> <ol style="list-style-type: none"> 1) Medium-soft nucleus pack (6 medium-soft nuclei) 2) Medium-hard nucleus pack (6 medium-hard nuclei) 3) Very hard nucleus pack (4 very hard nuclei)

■ Artificial cataract lens (disposable item) (keep refrigerated)

The artificial cataract lenses are separately available in a 6-piece pack. (The standard pack is the mixed nucleus pack containing 3 medium-soft and 3 medium-hard nuclei.)

The artificial cataract lenses are NOT included in the KITARO WetLab Kit. They need to be purchased separately when purchasing the KITARO WetLab Kit.



6-piece pack of artificial cataract lenses

(The above figure shows the mixed nucleus pack.)

(The medium-soft nucleus pack, the medium-hard nucleus pack, and the very hard nucleus pack are also available as optional items.)

〈Storage condition of artificial cataract lenses〉

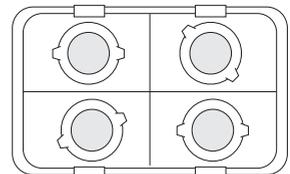
The artificial cataract lenses are recommended to be kept in the refrigerator. If they are stored at 5C° to 10C° in the refrigerator, the quality will be change. If they are stored at room temperature (10C° to 30C°), the quality will be stable for about 3 months. Please note that the quality will rapidly deteriorate under high temperature (above 40C°) or in the freezer (below 5C°).

In principle, the artificial cataract lenses are not refrigerated during transportation. As soon as you receive them, it is recommended to keep them at 5C° to 10C° in the refrigerator.

■ Cornea-iris part (consumable item)

The cornea-iris parts are consumable items and you can throw them away after making an incision each time or rotating and making another 3 to 4 incisions, or use the same incision a few dozen times until they are worn away.

The KITARO WetLab has 1 cornea-iris part included in the eyeball part and a 4-piece pack of cornea-iris parts. After you use them up, you need to purchase the additional 4-piece pack.



4-piece pack of cornea-iris parts for WetLab

■ Irrigation & Drainage system

The irrigation bag is included in the kit, but the drain system is an option. Please purchase the optional drainage box or prepare a substitute by yourself such as a tray for retaining water and a box for placing KITARO in the tray.

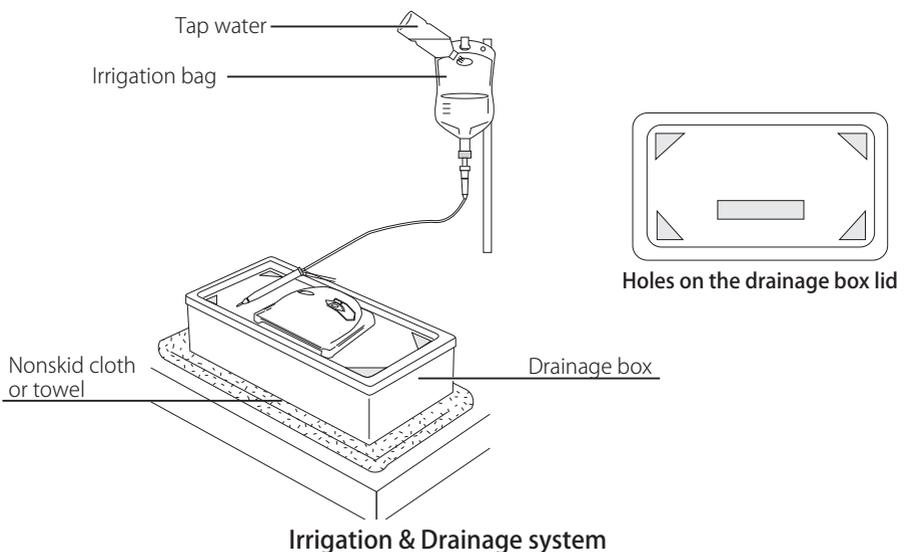
Irrigation bag

The irrigation bag is an empty 1300-ml saline bag with a hole in the upper part. Please pour tap water from a plastic bottle through the hole into the irrigation bag and connect the irrigation line to the phaco machine.

Drainage box (option)

The drainage box(option) is an airtight plastic container with holes for the water to drain. The holes are made at the four corners and at the site where the drainage comes from the KITARO's base plate in the lid, as shown in the figure below. Water is drained from these holes and is collected in the drainage box. (You can make the drainage system with an airtight container by making the holes. A 5-L container having a lid with the convex circumference is suitable.)

Please lay a nonskid cloth or towel under the drainage box and place the KITARO on the drainage box.



Practice Methods

■ Necessary items not included in the kit

- Artificial cataract lenses
- Viscoelastic substance and IOL (not absolutely necessary)
- Tap water in a plastic bottle
- Irrigation bag
- Drainage box or some other drainage system
- Phaco machine
- Operating microscope
- Knives

■ • Procedure

- Pour tap water from a plastic bottle through the hole into the irrigation bag (saline bag) included in the KITARO WetLab Kit.

- Connect it with the irrigation line of the phaco machine.

- Place the KITARO on the drainage box or any other drainage system.

- Put a small amount of vaseline on the U/S sleeve for better sliding.

- Take one artificial cataract lens from the 6-piece pack and set it in the hollow of the sclera part.

- Set the cornea-iris part in the sclera part.

- Place it on the oculomotor device on the base plate and cover it with the mask.

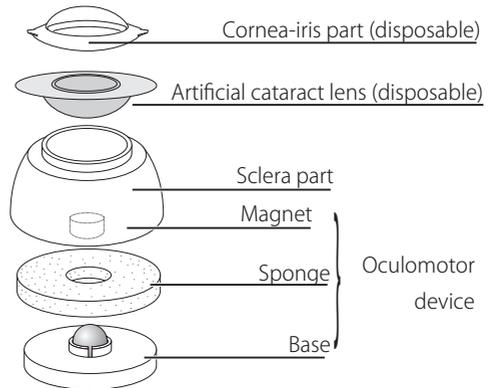
- Make an incision in the cornea with a knife.

- Fill the anterior chamber with the viscoelastic substance. Or, if you wish to save the viscoelastic substance, fill the anterior chamber with the water from the U/S handpiece and put a small amount of viscoelastic substance on the anterior-capsule film.

- Make CCC.

- Remove the piece of the anterior-capsule film cut out by CCC using a forceps. (It cannot be aspirated by the U/S tip.)

- Simulate the following surgical steps as with the human eye:



- Hydro procedures
- Surface cortex aspiration
- Nuclear segmentation (any techniques such as the Divide & Conquer, Stop & Chop, and Phaco Chop techniques)
- Emulsification and aspiration
- Cortex (Epinucleus) removal
- IOL insertion

■ Effective learning with knowledge of differences between KITARO and the human eye

The artificial eyeball of KITARO is designed to produce surgical performance similar to the human eye, but has some differences. Understanding the differences between the human eye and KITARO will promote more effective learning.

(1) Setting of the phaco machine:

When the aspiration pressure is set roughly twice as high as that for the human eye, similar performance to the human eye will be achieved in insertion of a U/S tip into the nucleus, holding of the nucleus with a U/S tip, and emulsification and aspiration of nuclear fragments. (If the same setting as that for the human eye is made, the efficiency will decrease in these procedures.)

(2) Wound construction

For KITARO WetLab, the 13-mm clear cornea part and 1-mm slightly opacified limbus part are made of soft materials. The sclera part is made of hard materials. Therefore, scleral incision cannot be practiced with KITARO WetLab in general. An incision should be made as if corneal incision or limbal incision.

For practicing scleral incision, attach a precut sclerocorneal sheet to the sclera part and make a perforation into the anterior chamber from the sclerocorneal sheet towards the soft cornea part. In this way, you can practice sclerocorneal incision although there is a difference in level between the sclerocorneal sheet and the cornea.



Practicing 1-plane incision using a keratome

(3) CCC construction

With KITARO, CCC can be made very similarly in the human eye of the elderly. However, CCC can be easily recovered even if CCC strayed towards the equator because KITARO does not have the zonule. As a countermeasure, multiple radial small incisions should be made in the anterior capsule near the pupillary margin so that CCC recovery is not achieved easily.



CCC using a cystotome

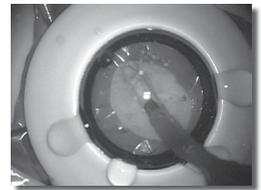
If a new cystotome other than the one provided is used, render the tip obtuse by rubbing it against something hard because a sharp tip can easily cause puncture of the anterior capsule.

(4) Hydro procedures

Hydro procedures can be performed with KITARO, and the nucleus rises in the anterior chamber when water flows into the rear side of the nucleus. The actual water flowing into the rear side of the nucleus is not observed.

(5) Nuclear segmentation, phacoemulsification & aspiration

Please expose the surface of the nucleus (yellow color is present) by removing the surface cortex (white and thick cortex is present in the medium-soft nucleus; fibrous and thin cortex is present in the medium-hard nucleus) by ultrasound and aspiration before starting the nuclear dividing procedure.



Grooving

The medium-soft nucleus of the artificial cataract lens of KITARO is prone to breakage when it is handled with an instrument having a sharp tip. Therefore, it is recommended to use an instrument having a plane tip. When the nucleus is divided into two, sufficiently deep grooving is required. In the Phaco Chop technique, it is also required to insert a U/S tip deeply. Shallow grooving or insertion cannot successfully divide the medium-soft nucleus. These properties are the same as the soft nucleus in the

human eye. The medium-soft nucleus is suitable for practice of grooving techniques (e.g. Divide & Conquer, Stop & Chop). Beginners should learn about the thickness and shape of the nucleus from grooving practice and are recommended to master grooving techniques first with the medium-soft nucleus.



Phaco Chop

With the medium-hard nucleus, it is easier to perform segmentation, compared to the medium-soft nucleus (same as in the human eye). If the aspiration pressure is set very high (at about 500 mmHg), holding of the nucleus and emulsification and aspiration can be performed, just like in the human eye.

Note that when the nucleus is broken apart by ultrasound, smoke-like opacity occurs, like when using Ozil. When Ozil is used, more smoke is produced.

With the medium-hard and very hard nuclei, nuclear fragments may obstruct the U/S tip or handpiece. Such obstruction can be removed by injecting water from the tube connected to the aspiration line of the U/S handpiece. Beginners should start the practice with the medium-soft nucleus, without concerns about obstruction.

(6) Cortex (epinucleus) aspiration

The cortex of the medium-soft nucleus of KITARO can be aspirated with an I/A tip (it sometimes requires to crush with a hook), but it is not like peeling from the capsule in the human eye and it is aspirated as the isolated slightly harder cortex.

The cortex of the medium-hard nucleus cannot be aspirated with an I/A tip. It should be aspirated with a U/S tip as the slightly hard cortex or epinucleus.

(7) Posterior capsule rupture

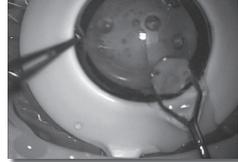
The posterior capsule of KITARO is slightly stronger than that of the human eye, so it is not ruptured with a U/S tip at a low aspiration pressure or with a round hook unless it is pushed hard. However, if it is scratched with a thin hook or aspirated with a U/S tip at a high aspiration pressure, capsule rupture will occur (you may also experience nuclear

dropping).

If posterior capsule rupture occurs, you should practice intraoperative complication management such as extension of incision and extraction of nuclear fragments using a vectis or in the visco-extraction technique. In such case, vitreous prolapse will not actually occur, but you should also practice instrumentation for two-port vitrectomy.



Posterior capsule rupture



Extraction of nuclear fragment using a vectis

(8) IOL insertion

This can be performed as in the human eye. However, eyeball collapse will not occur with KITARO, even if the water or viscoelastic substance in the anterior chamber drains out.

(9) Wound self-sealing

With the cornea of KITARO, the intraocular pressure is not increased by self-sealing like in the human eye even if the water is poured from the side port. The self-sealing and hydration to the wound should be practiced by going through the motions.

(10) Red fundus reflex during surgery

When the nucleus or cortex of KITARO is present, red fundus reflex cannot be seen like in the human eye. In order to cover this disadvantage, the capsule, cortex, and nucleus are colored to gain better visibility of their tissues and give a cubic effect during surgery.

■ Effective learning at the wet lab held by a university, a company, or congress.

You would often face a situation where participants must wait their turns of using a phaco machine during wet lab held by a university, a company, or congress due to a limited number of phaco machines.

These participants can effectively learn without losing their time if KITARO DryLab is used for practicing or teaching during the waiting time.

[Developed, Manufactured, & Distributed by:]

Frontier Vision Co., Ltd.



4-7, Futami-cho, Nishinomiya,
Hyogo, 663-8111 Japan
TEL: +81 798 68 6555
FAX: +81 798 68 6556
E-mail: info@frontiervision.co.jp
URL: <http://www.frontiervision.co.jp/>