Nucleus Dividers

Horizontal, Vertical and Pre chopping instruments

1.8 mm incision
Horizontal Chopping

During the horizontal chop technique the lens nucleus is held in position using relatively high vacuum by the phacoemulsification tip buried in the centre of the nucleus. The horizontal chopper is passed under the distal edge of the anterior capsulotomy and around the lens equator, then drawn through the lens nucleus toward the phaco handpiece in the horizontal plane. The phaco tip and chopper are separated laterally, breaking the nucleus into two pieces. The horizontal choppers have a cutting edge which enables the chopper to cut through the nucleus in a specific direction.

### 6-072-1 Bordeianu Chopper

- Tip length 1.75mm
- Sharp inner sides of tip
- Cutting edge 60° degrees to axis
- 60° angled shaft, Tip to angle length 10mm
- Round handle, length 124mm

Designed for use as a horizontal and oblique nucleus chopper, the cutting segment of the chopper extends around the bend and along the horizontal shaft. The chopper tip is inclined back towards the nucleus to ensure the capture of even hard nuclei. May be used as a nucleus sustainer, the ball at the base of the chopper is smooth to protect the posterior capsule. The leading edge of the chopper is smooth which is ideal for iris manipulation. The horizontal shaft has a 0.55mm parallel diameter to reduce leakage through a 23 gauge incision.

### 6-074 Arasaslan Nucleus Chopper (designed for left side port)

- Sharp point, tip length 1.4mm
- Cutting edge 30° to axis
- 60° angled curved shaft
- Tip to angle length 9.8mm
- Round handle, length 115mm

### 6-074-1 Arasaslan Nucleus Chopper and Spatula (designed for left side port)

- Nucleus Cutter
  - Sharp point, tip length 1.2mm
  - Cutting edge 30° to axis
  - 60° angled curved shaft, tip to angle length 9.8mm

- Spatula
  - 0.4mm diameter blunt tip spatula
  - 45° angled shaft, tip to angle length 11mm
  - Round handle, length 119mm
<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
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<tr>
<td>6 - 075 Packard 'Fat Boy' Nucleus Chopper and Capsule Retractor</td>
<td><strong>Nucleus Cutter</strong>&lt;br&gt;- Straight, sharp inner sides of tip, tip length 1.26mm&lt;br&gt;- Cutting edge 0° to axis&lt;br&gt;- Tapered shaft seal incision site to reduce leakage&lt;br&gt;- 50° angled shaft, tip to angle length 10mm</td>
<td><strong>Retractor</strong>&lt;br&gt;- 0.25mm tip&lt;br&gt;- Tapered shaft seal incision site to reduce leakage&lt;br&gt;- 45° angled shaft, tip to angle length 10mm&lt;br&gt;- Round handle, length 130mm</td>
</tr>
<tr>
<td>6 - 075-1 Packard Nucleus Cutter</td>
<td><strong>Nucleus Cutter</strong>&lt;br&gt;- Straight, sharp inner sides of tip, tip length 1mm&lt;br&gt;- Cutting edge 0° to axis&lt;br&gt;- 50° angled shaft with slight curve, tip to angle length 10mm&lt;br&gt;- Round handle, length 118mm</td>
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</tr>
<tr>
<td>6 - 076 Rosen Nucleus Divider (designed for left side port)</td>
<td><strong>Nucleus Divider</strong>&lt;br&gt;- Straight, sharp inner sides of tip, length 0.8mm&lt;br&gt;- Cutting edge 45° to axis&lt;br&gt;- 45° angled shaft, tip to angle length 10mm&lt;br&gt;- Round handle, length 120mm</td>
<td></td>
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<tr>
<td>6 - 077 DK Nucleus Divider (designed for left side port)</td>
<td><strong>Nucleus Divider</strong>&lt;br&gt;- Straight, sharp inner sides of tip, tip length 1.45mm&lt;br&gt;- Cutting edge 45° to axis&lt;br&gt;- 45° angled shaft, tip to angle length 10.5mm&lt;br&gt;- Round handle, length 120mm</td>
<td></td>
</tr>
<tr>
<td>6 - 079 Green Nucleus Divider (designed for left side port)</td>
<td><strong>Nucleus Divider</strong>&lt;br&gt;- Curved, sharp inner sides of tip, tip length 1mm&lt;br&gt;- Cutting edge 45° to axis&lt;br&gt;- 60° angled shaft, tip to angle length 10mm&lt;br&gt;- Round handle, length 114mm</td>
<td></td>
</tr>
</tbody>
</table>
6 - 079 - 1 Green Nucleus Divider (designed for right side port)

- Curved, sharp inner sides of tip, tip length 1mm
- Cutting edge 45° to axis
- 65° angled shaft, tip to angle length 9mm
- Round handle, length 117mm

6 - 080 DK Nucleus Divider

- Straight, sharp inner sides of tip, tip length 1.25mm
- Cutting edge 0° to axis
- 45° angled shaft, tip to angle length 14mm
- Round handle, length 122mm

6 - 080 - 2 DK Nucleus Divider / Rotator

- Straight, sharp inner sides of tip, tip length 1.25mm
- Cutting edge 0° to axis
- 45° angled shaft, tip to angle length 14mm

6 - 081 DK Nucleus Divider (designed for left side port)

- Straight, sharp inner / outer sides of tip, tip length 1.25mm
- Cutting edge 45° to axis
- 45° angled shaft, tip to angle length 14mm
- Round handle, length 122mm

6 - 081 - 3 DK Nucleus Cutter (designed for left side port)

- Straight, sharp inner / outer sides of tip, tip length 1.25mm
- Cutting edge 30° to axis
- 45° angled shaft, tip to angle length 10.5mm
- Round handle, length 119mm

www.duckworth-and-kent.com
6 - 083 Hara Nucleus Divider, straight (designed for left side port)

- Straight, sharp inner sides of tip, tip length 1.1mm
- Cutting edge 45° to axis
- 45° angled shaft, tip to angle length 11mm
- Round handle, length 116mm

6 - 083 - 1 Hara Nucleus Divider, curved (designed for left side port)

- Curved, sharp inner sides of tip, tip length 1.1mm
- Cutting edge 35° to axis
- 45° angled shaft, tip to angle length 11mm
- Round handle, length 115mm

6 - 083 - 4 Hara Curved Nucleus Divider (designed for left side port)

- Curved sharp inner sides of tip, tip length 1.4mm
- Cutting edge 70° to axis
- Tip to angle length 13.5mm

6 - 083 - 5 Sibilio Nucleus Chopper & Manipulator

- Straight sharp inner sides of tip, tip length 1.25mm
- Cutting edge 60° to axis
- Tip to angle length 11mm

The thinner profile of the chopper facilitates ease of insertion under the capsule whilst maintaining maximum strength of the chopper tip.

Duckworth & Kent - Titanium
6 - 085 Barrett Duo Nucleus Rotator / Manipulator / Splitter

Smooth tip manipulator is useful as a nucleus rotator / manipulator in four quadrant nucleo fractis techniques. End of manipulator is ideal for retracting iris during phacoemulsification and inserting IOLs. Nucleus Splitter used during phacoemulsification techniques such as phaco chop and modified phaco chop procedures.

6 - 085 - 1 Barrett Duo Nucleus Rotator / Manipulator / Splitter

6 - 085 - 3 DK Nucleus Divider / Rotator

6 - 085 - 6 DK Barrett Nucleus Divider and Chopper
**6 - 085 - 7 Barrett Phaco Axe and Horizontal Chopper**

- **Nucleus Divider, Horizontal Chopping**
  - Straight, sharp inner / outer sides of tip
  - Tip length 1.25mm
  - Cutting edge 60° to axis
  - 45° angled shaft, tip to angle length 14mm

- **Barrett Phaco-Axe, Vertical Chopping**
  - 0.75mm x 0.75mm axe, left side port
  - 45° angled shaft, tip to angle length 10mm
  - Barrett balanced set handle, length 125mm

**6 - 085 - 8 Double Ended Nucleus Chopper and Rotator**

- **Nucleus Divider, Horizontal Chopping**
  - Straight, sharp inner / outer sides of tip
  - Tip length 1.25mm
  - Cutting edge 60° to axis
  - 45° angled shaft, tip to angle length 14mm

- **Nucleus Rotator**
  - 1 x 0.5mm blunt tip
  - 45° angled shaft, tip to angle length 10mm
  - Barrett balanced set handle, length 125mm

**6 - 086 Inamura Nucleus Divider / Manipulator (designed for right side port)**

- **Nucleus divider**
  - Straight, sharp inner sides of tip
  - Tip length 1.1mm
  - Cutting edge 45° to axis, angled left
  - 45° angled shaft, tip to angle length 11mm

- **Manipulator**
  - 0.55mm ball shaped tip
  - 45° angled shaft, tip to angle length 11mm
  - Round handle, length 129mm

**6 - 086 - 1 Inamura Nucleus Divider / Manipulator (designed for left side port)**

- **Nucleus divider**
  - Straight, sharp inner sides of tip
  - Tip length 1.1mm
  - Cutting edge 45° to axis, angled right
  - 45° angled shaft, tip to angle length 11mm

- **Manipulator**
  - 0.55mm ball shaped tip
  - 45° angled shaft, tip to angle length 11mm
  - Round handle, length 129mm
6 - 086 - 4 Inamura RACE Hook - Right Hand

- Tip to angle length 0.5mm
- Tip length, angle to angle, 1.5mm
- 40° angle to tip length 9mm
- Round handle, length 119mm

6 - 086 - 7 Inamura RACE Hook - Left Hand

- Tip to angle length 0.5mm
- Tip length, angle to angle, 1.5mm
- 40° angle to tip length 9mm
- Round handle, length 119mm

6 - 086 - 5 Jakobsen Barrett Nucleus Cutter and Rotator (designed for left side port)

- Blunt ended tip with straight, sharp inner sides
- Tip length 1mm
- Cutting edge 15° to axis
- 45° angled shaft, tip to angle length 10mm

6 - 086 - 6 DK Nucleus Cutter and Repositor (designed for left side port)

- Straight, sharp inner sides of tip
- Tip length 1.25mm
- Cutting edge 45° to axis
- 45° angled shaft, tip to angle length 14mm

6 - 091 DK Double Ended Nucleus Divider and Rotator

- Straight, sharp inner / outer sides of tip
- Tip length 1.25mm
- Cutting edges 60° to axis
- 45° angled shaft, tip to angle length 14mm

Rotator
- 0.67mm forked style tip
- 45° angled shaft, tip to angle length 9mm
- Round handle, length 127mm

Nucleus Rotator
- 0.65 highly polished mushroom
- 45° angled shaft, tip to angle length 10mm
- Round handle, overall length 126mm

Nucleus Cutter
- 0.5mm diameter blunt tip spatula
- 45° angled shaft, tip to angle length 14mm
- Round handle, length 132mm
The **Phaco-Axe** is a wedge-shaped instrument designed to produce a quick vertical crack of the nucleus during phacoemulsification. The wedge produces a fracture in the vertical plane of the nucleus along fault lines that exist aligned with the lens. The axe manoeuvre consists of 4 steps, which occur in rapid sequence so that it appears as one fluid movement.

**Step 1.** The initial step is to engage the nucleus deeply to at least 50% of the nuclear thickness. A small amount of phaco energy is required to embed the nucleus, which is then held with vacuum alone. The phaco tip should not advance significantly beyond the centre of the nucleus so that there is sufficient space to place the axe in front of the tip.

**Step 2.** The axe is then moved vertically downwards just in front of and adjacent to the phaco tip to initiate a vertical cleft in the nucleus.

**Step 3.** The phaco tip moves in an upward and outward motion separating the segment of nucleus away from the axe, which holds the remainder of the lens in position and extending the vertical cleft created by the axe into a crack.

**Step 4.** The final motion is to separate the axe and the phaco tip to propagate the crack through the full thickness of the lens. The initial crack tends to propagate along the entire lens and is not confined to one quadrant as tends to occur with initial sculpting and cracking associated with divide and conquer techniques.

**Vertical chop** is a variant of the Horizontal Chop technique in which the chopper is not passed horizontally around the lens equator, but rather enters the nucleus vertically near the centre of the lens. The Vertical Chop technique benefits from good visualization of the chopper throughout the procedure and the avoidance of proximity to the capsular bag, resulting in increased safety.

After the quick **vertical crack** the segment is engaged on the phaco tip and is removed with the application of ultrasound energy. The axe is well suited to rotating the nucleus for the next vertical crack. The entire axe manoeuvre is performed within the margins of the capsulorhexis unlike horizontal chopping procedures where access to the lens equator under the rhexis is required. High vacuum levels are therefore not necessary to engage the nucleus as in conventional chopping procedures where the chopper tends to displace the segment of nucleus from the phaco tip. A mushroom manipulator is better suited for manipulating epinuclear material and this is provided on the other end of the phaco axe. The technique is well suited to Dual Linear systems where the linear control of phacoemulsification and aspiration allows the surgeon to simultaneously control these parameters and use just the required energy and aspiration to embed the phaco tip and remove each segment of nucleus. The Phaco-Axe produces a quick vertical crack of the nucleus, which allows the surgeon to rapidly fracture and remove a cataract with less energy than conventional nucleofractis techniques and with greater safety and precision than other chopping manoeuvres.
<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
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<tbody>
<tr>
<td>6-087-5</td>
<td>Barrett Double Ended Phaco-Axe (designed for left side port)</td>
</tr>
<tr>
<td>Phaco-Axe</td>
<td>0.75 x 1.10mm axe</td>
</tr>
<tr>
<td></td>
<td>Axe direction suitable for a right handed surgeon</td>
</tr>
<tr>
<td></td>
<td>45° angled shaft, tip to angle length 10mm</td>
</tr>
<tr>
<td>6-085-5</td>
<td>Mackool Phaco Chopper</td>
</tr>
<tr>
<td>Chopper</td>
<td>Straight miniature ball shaped tip, tip length 0.7mm</td>
</tr>
<tr>
<td></td>
<td>45° angled shaft, tip to angle length 10mm</td>
</tr>
<tr>
<td>6-085-7</td>
<td>Barrett Phaco Axe and Horizontal Chopper</td>
</tr>
<tr>
<td>Nucleus Divider, Horizontal Chopping</td>
<td>Straight, sharp inner / outer sides of tip</td>
</tr>
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<td></td>
<td>Tip length 1.25mm</td>
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<td></td>
<td>Cutting edge 60° to axis, left or right side port</td>
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<tr>
<td></td>
<td>45° angled shaft, tip to angle length 14mm</td>
</tr>
<tr>
<td>6-085-7</td>
<td>Barrett Phaco-Axe, Vertical Chopping</td>
</tr>
<tr>
<td></td>
<td>0.75mm x 0.75mm axe</td>
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<tr>
<td></td>
<td>45° angled shaft, tip to angle length 10mm</td>
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<tr>
<td></td>
<td>Barrett balanced set handle, length 125mm</td>
</tr>
<tr>
<td>6-085-5</td>
<td>Barrett Double Ended Phaco-Axe (designed for left side port)</td>
</tr>
<tr>
<td>Phaco-Axe</td>
<td>0.75 x 0.75mm axe</td>
</tr>
<tr>
<td></td>
<td>45° angled shaft, tip to angle length 10mm</td>
</tr>
<tr>
<td></td>
<td>Barrett balance handle, length 124mm</td>
</tr>
<tr>
<td>6-087-1</td>
<td>Mackool Double Ended Phaco Chopper and Spatula</td>
</tr>
<tr>
<td>Chopper</td>
<td>Straight miniature ball shaped tip, tip length 0.7mm</td>
</tr>
<tr>
<td></td>
<td>45° angled shaft, tip to angle length 10mm</td>
</tr>
<tr>
<td>Spatula</td>
<td>0.4mm diameter blunt tip spatula</td>
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<td></td>
<td>50° angled shaft, tip to angle length 11mm</td>
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<td></td>
<td>Round handle, length 114mm</td>
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<tr>
<td>6-090</td>
<td>DK Nucleus Divider Hook</td>
</tr>
<tr>
<td></td>
<td>Straight, bulbous shape flat tip</td>
</tr>
<tr>
<td></td>
<td>Tip width 0.62mm, length 0.9mm</td>
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<tr>
<td></td>
<td>35° angled shaft, tip to angle length 11mm</td>
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<tr>
<td></td>
<td>Round handle, length 114mm</td>
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</tbody>
</table>
6 - 090 - 2 Kozaki Dividing Hook

- Dividing hook, 1.1mm in length and 0.6mm in width
- 40° angled shaft, tip to angle length 11mm
- Round handle, length 114mm

6 - 090 - 3 Sugiura Central Divider

- Paddle shape divider, tip 1.7mm long by 0.6mm wide
- Curved shaft at 45° angle, tip to angle length 10mm
- Round handle, length 113mm

6 - 090 - 4 DK Nucleus Divider

- Paddle shape divider, tip 1.25mm long by 0.6mm wide
- Straight shaft at 35° angle, tip to angle length 11mm
- Round handle, length 115mm

6 - 090 - 6 Wada Nucleus Dividing Hook

- Paddle shape divider, tip 1.35mm long by 0.6mm wide
- Straight shaft at 40° angle, tip to angle length 11mm
- Thinner dividing edge on right side (for use through left side port)
- Round handle, length 114mm

Duckworth & Kent - Titanium
**6-093 DK Nucleus Divider**

- Straight, blunt tip, tip length 1mm
- 45° angled shaft, tip to angle length 12mm
- Round handle, length 120mm

**Femto Instruments**

- Designed for the lens that has been **femtosecond laser treated** and is being removed with zero or little ultrasound power

**Scott Femto Chop Technique** and **Scott Endolenticular Viscodissection** involve segmenting the lens along the femto segment treatment lines and then using the curve of the tip to manipulate the segments into the central anterior chamber. The curve also avoids inadvertent damage to the capsule. While removing the segments, the curve of the chop is placed in close proximity to the phaco tip and protects the tip from contact with the capsule. The shaft of the chop is a consistent diameter and helps control fluid egress, helping stabilise the chamber.

**6-071 Scott Femto Chop**

- Curved, smooth round tip
- Tip to angle length 10mm
- 45° degree angled shaft
- Round handle, length 120mm
- 0.45 constant diameter shaft to reduce leakage

**6-850 Cionni Femto Spatula and Nucleus Divider**

- Opens primary and secondary femto created incisions

**Femto Spatula**
- Fine point, 0.5mm width
- 3mm spatula blade

**Nucleus Divider**
- Blade 1.6mm x 0.8mm
- Round handle, length 131mm

- Used for pushing and pulling the iris or anterior capsule edge
The procedure allows the surgeon to mechanically divide the nucleus prior to placing the phacoemulsification tip into the eye. This easy technique eliminates grooving or sculpting with the phaco tip and the risk of rupturing the posterior capsule during grooving is diminished. Shortened ultrasonic time and minimal movement of phaco tip minimizes wound damage and contributes to self-sealing wound. Ultrasonic time can be reduced to half of the conventional grooving method.

The recent designs of prechoppers have made the procedure easier, safer and can be done on any grade of nuclei. The Prechopper Forceps have two flat blades which are closed during entry into the nucleus, but can separate once inside the nucleus. The current design of prechoppers have a combo tip that features a sharp angled edge on one side of the blade and a rounded blunt edge on the other side. The angled blade is usually used for the initial insertion and for rotating the bisected nuclear fragments. The rounded blade is used not only for prechopping very soft nuclei, but also for ascertaining the complete nuclear split close to the posterior capsule.

**Technique**

The Prechopper is inserted toward the centre of the lens nucleus. When the Prechopper blades are in the nucleus, they are separated and the nucleus begins to crack. The Prechopper tip should be turned to the smooth side/back and then advanced deeper into the crack and the nucleus splits. The Prechopper tip is used to rotate the nucleus so that it can be split again perpendicular to the original split. If resistance is felt the Akahoshi Nucleus Sustainer (6-095) can be used as a second instrument to stabilise the nucleus and provide counter-traction, common in cases of harder nuclei. This technique of supporting the nucleus during Prechop is also used in cases with complications, such as week zonules.

**The Prechopper shafts**

are designed to enter a small incision and during operation cause minimal stretching of incision. The shafts of the forceps open to a maximum of 1.7mm at the incision point whilst the tips open to 2.5mm.

**Cross Over**

Designed to fit through a 1.8mm incision, but allowing tips to open to a maximum of 2.5mm.
2 - 2 - 815 Akahoshi Prechopper Forceps

- Tips fully open to 2.5mm
- Smooth pointed tips
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

2 - 2 - 815 - 4 Salvitti Akahoshi Combo Prechopper Forceps

- Tips fully open to 2.5mm
- Flattened tips in vertical plane, tip height 1.3mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

2 - 2 - 817 Salvitti Akahoshi Micro Prechopper (small tip)

- Tips fully open to 2.5mm
- Flattened tips in vertical plane, tip height 1.3mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

2 - 2 - 817 - 1 Salvitti Akahoshi Micro Prechopper (large tip)

- Tips fully open to 2.5mm
- Flattened tips in vertical plane, tip height 1.5mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

2 - 2 - 818 Inamura Talon Prechopper

- Tips fully open to 2.5mm
- Flattened tips in vertical plane, tip height 1.6mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm
2 - 2 - 819 Masaoka Paddle Prechopper Forceps

- Tips fully open to 2.5mm
- Arrow tip shape for penetrating nucleus
- Flattened paddle area of tips for nucleus splitting,
- Tip height 1mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

Tips closed, handle at rest (open)

Tip height 1mm

Tip of instrument has pointed sharp front edges that initially penetrates nucleus; squeeze forceps, tips open to crack and split nucleus. The narrow paddle is easy to insert into denser nucleus.

2 - 2 - 820 Paddle Prechopper Forceps Angled 45°

- Tips fully open to 2.5mm
- Arrow tip shape for penetrating nucleus
- Flattened paddle area of tips for nucleus splitting,
- Tip height 1mm
- 1.8mm maximum width at incision point
- 45° angled, reverse cross action style
- Tip to angle length 13.5mm
- 8mm diameter round handle, length 123mm

Tip height 1mm

2 - 2 - 820 - 1 Paddle Prechopper Forceps

- Tips fully open to 2.5mm
- Arrow tip shape for penetrating nucleus
- Flattened paddle area of tips for nucleus splitting,
- Tip height 1mm
- 1.8mm maximum width at incision point
- Straight shafts, reverse cross action style
- 8mm diameter round handle, length 123mm

Tip height 1mm

6 - 095 Akahoshi Nucleus Sustainer

Placed to sustain nucleus. Used in conjunction with prechopping series forceps.

- 0.5mm diameter bulbous tip, tip length 1.7mm
- 45° angled shaft, tip to angle length 10mm
- Short round handle, length 109mm
2 - 800 Brown Nucleus Cracker

Cracking with minimal loss of viscoelastic and maintains anterior chamber depth. Design that keeps cross point of instrument in wound, reducing outflow of viscoelastic.

- 1.5mm x 1.2mm paddle style tips
- Straight shafts
- Flat cross action handle, length 98mm

2 - 802 Angled Brown Nucleus Cracker

- 1.1mm x 1.2mm paddle style tips
- 30° angled shafts, tip to angle length 14.5mm
- Flat cross action handle, length 99mm

2 - 803 Denman Brown Nucleus Cracker

- 1.1mm x 1.2mm paddle style tips
- Bulge along lower edge of paddle
- 30° angled shafts, tip to angle length 14.5mm
- Thin shaft design
- Flat cross action handle, length 99mm