EVOLUTIS

MOBILIS, CAPTIV and CAPITOLE
Dual Mobility acetabular cups

With over 30 years of Clinical use, the dual mobility principle has clinically demonstrated its usefulness and advantages over standard fixed acetabular cups in many indications of total hip surgery. The main advantages include:

- Large amplitude of motion and stability
- Very low risk of dislocation (about 1 per thousand)
- Slightly less polyethylene wear than with a conventional cup

The original system was invented in 1976 by Professor Gilles Bousquet from the University Hospital of Saint Etienne, France, and now accounts for a significant proportion of acetabular cup implants in France. The dual mobility concept is spreading internationally now that long term results have proven the advantages and dispelled the concerns, in particular related to polyethylene wear.

The MOBILIS, CAPTIV and CAPITOLE ranges by EVOLUTIS are derived from the original idea but the articular concept has never been changed. Today’s range of shell configurations suits simple primary surgery through to complex revisions, using simple, robust and precise instrumentation.

Patient groups which have a higher than average risk of dislocation and which may benefit most from the increased stability conferred by the MOBILIS, CAPTIV and CAPITOLE dual mobility cup range include:

**Trauma**
- Displaced fractured necks of femur in patients who are still active and require a total hip replacement.

**Primary hip replacements**
- Active elderly patients (>70)
- Non compliant patients (dementia, alcohol..)
- Tumours
- Joint laxity (neuro muscular disorders, age)
- Dysplasia & congenital dislocations
- Rheumatoid Arthritis

**All revisions**
- Revisions, any reason since the risk of dislocation after revisions increases
- For dislocations of primary hips because many dislocations become recurrent
The Dual Mobility principle

The polyethylene insert is mobile around the head of the prosthesis which is held captive by a retentive collar. The polyethylene insert is completely free to move inside the highly polished metal shell. Movement occurs at 2 interfaces, with preferential articulation (α), between the head and the inside of the polyethylene insert which itself then articulates within the concavity of the metal shell when the neck comes into contact with the retentive collar (β). Most of the motion is the first mobility, the second mobility only occurring in large amplitudes such as when seated or going up stairs. The head to neck ratio will influence when the second mobility comes into action.

The effective head size is that of the polyethylene insert, so the jump gap to dislocation is large. For example a 53mm cup will have an insert of 47mm. The Mobilis range will have effective head sizes of 39 to 57mm for corresponding external shell diameters of 45 to 63mm.

The range of motion before impingement of the prosthetic neck on either the shell or surrounding bone is therefore much more than can be achieved with standard implants with 22,2, 28 or 32mm heads, and size for size, still compares favourably to the larger ceramic on ceramic or metal metal total hip replacements. The range of motion will also be influenced by diameter, neck thickness and cup orientation.

For example
MOBILIS, CAPTIV and CAPITOLE cups by EVOLUTIS

Polyethylene -crosslinked
The UHMW Polyethylene used by EVOLUTIS is packaged under vacuum and subsequently irradiated. This eradicates the problems associated with surface oxidation and oxygen free radicals which compromise polyethylene longevity. The irradiation is at levels which induce a certain amount of cross linkage without being highly cross linked.
This UHMW polyethylene conforms to ISO 5834-1 and 2
The long term results of the original Bousquet cups which used standard and not cross linked PE demonstrate clearly that PE wear was only a problem in the younger age groups under 65 or 70, as with cups with fixed PE.

EVOLUTIS have developed an Alumina – Alumina and PE dual mobility system. There is an alumina bearing inside the PE insert. Since most of the movement is at this bearing, and PE wear on the outer convexity of the PE has been demonstrated to be minimal, the results in younger patients which are wear related will improve.
UHMWPE/Ceramic in compliance to ISO 5834-1 &2 and ISO 6474.

Shells
EVOLUTIS shells enable cemented and cementless use, all having highly polished interior articulating surfaces.
All cups are made from M30NW stainless steel since this has demonstrated excellent clinical results with the original dual mobility cups.
MOBILIS cups are ISO 5832 -1 standard, CAPTIV and CAPITOLE cups ISO 5832 – 9 standard.

In the cemented cups the outer surface is brush polished. The outer shape has ridges and dimples allowing for an adequate cement mantle, whilst the peripheral rim allows for cement pressurisation and cup centring in line with Charnley principles.

The shells of the cementless cups are have a dual coating of plasma titanium spray and hydroxyapatite, with a surface porosity of 100µm.
All have flattened poles and peripheral press fit to ensure optimum primary fixation when impacted, size for size after reaming.

The external configurations of the EVOLUTIS dual mobility ranges enable the surgeon to adapt to different surgical situations from straightforward primary total hip replacement to complex revisions which may need screw, flange and peg fixation to augment primary stability.

The acetabular cage accepts all types of cemented cups, the PE spacers ensure an adequate cement mantle and are perfectly adapted to use with EVOLUTIS cemented cups.
Clinical results

- **Long term clinical results** from a number of centres have demonstrated excellent cup survivorship results and the stability of the dual mobility principle (1, 2, 3).
- **Stability** in dislocation prone surgeries is better than with "normal" cups with fixed bearings (5, 6).
- **Wear of polyethylene** is slightly less than cups with a fixed PE bearing in all age groups (4). It is much less than feared by many in the past, particularly in patients over the age of 65 to 70. Many surgeons initially feared excessive backside wear and wear of the retentive collar; results have demonstrated this to be untrue, as with rotating platform knees. There is no increase in stem revision rate due to PE wear particle induced ostelysis when using dual mobility cups (1, 2).
- **Intraprosthetic dislocation** where the retentive collar becomes worn by the prosthetic neck and so the head can come out of the polyethylene is a known but rare complication, and is again age and activity dependant (1, 2). It is also influenced by the shape and texture of the prosthetic neck. Smooth, polished round necks are better to avoid wear of the retentive collar.

The risks of radiolucent lines and subsequent loosening associated with completely retentive cups are eliminated with dual mobility cups.

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1) Study of dual mobility socket with a mean 17 years follow up 438 cups  
University Hospital St Etienne  
Publication RCO, 2008, 94, 43 - 48  
*Cup survival with aseptic loosening only as end point at 15 years 96,3% +/- 3,7%*  
*Overall prosthesis (cup & stem) survival, failure being all aseptic revisions, any cause 89,2% +/- 8,7% at 15 years*  
*No dislocations*  
*No failures for loosening, wear or intraprosthetic dislocation in patients over the age of 70 (12% of the under 65's, 4,2% of the over 65’s)*
2) Survival of the cementless Bousquet dual mobility cup: Minimum 15 year follow up of 437 total hip arthroplasties
C. Lautridou, B. Lebel, G. Burdin, C. Vielpeau
University Hospital of Caen
Publication RCO, 2008, 94, 731 – 739
Actuarial survivorship curves
- 84.4% survivorship (+/- 4.5) at 15 years if cup removal is the only cause of revision.
- 85.2% (+/- 4.4) at 15 years for only mechanical failures (excluding infections n=7)
- 90.1% (+/- 4.6) at 15 years for Primary OA using aseptic loosening of cups and stems
- Only 5 dislocations (1.1% at 15 years). 2 were early and due to technical errors, only 3 intraprosthetic dislocations, later on at 8, 11 and 16 years.
- No backside wear due to the studs (often a cause of concern for surgeons) Explant analysis confirms that there was no excessive wear of dual mobility inserts.
- Aseptic loosening correlated to age at time of operation (p= 0.01) and professional activity (p= 0.0079). Aseptic loosening accounted for 30 revisions (15 cups, 15 stems)

3) Ten year survivorship of an un-cemented dual mobility cup (Novae)
Rémi Phillipot
University Hospital St Etienne
Publication : Revue de Chirurgie orthopédique, 2006, 92, 326 - 321
94.6% survivorship at 10 yrs, (90.7% in under 50s, 98% in over 50s)
No dislocations

4) Analysis of surfaces of 50 explanted dual mobility polyethylene inserts
P. Adam, F. Farizon, L. Beguin, M-H Fessy
University Hospital St Etienne
SOFCOT 2000 Poster Presentation
Internal + External wear = 0.076mm year (negative correlation with duration of implantation, p= 0.0416) Average age at implantation 46 years.
Comparison with Wroblewski study (1986) on 116 patients, Charnley prostheses, average age 53, wear = 0.096mm per year

5) Total hip replacement after femoral neck fractures: Reducing the risk of dislocation by using Dual Mobility Cups
O. Vanel, F. Farizon, M-H Fessy
University Hospital Lyon Edouard Herriot
3 real dislocations (2%), 1) due to subsequent fracture with subsidence, 2) Posterior dislocation in a very sick patient who died within 48 hrs, 3) Due to pronounced retroversion of the cup needing revision

6) The use of dual mobility cups in prosthetic hip revisions for instability
O. Guyen, V. Pibarot, G. Vaz, C. Chevillotte, JP Carret, J. Bejui
University Hospital Lyon, Edouard Herriot
SOFCOT 2005 Poster Presentation
45 repeat dislocations (44 dislocations, 1 subluxation)
2 re-dislocations (4%), 1 subluxation (under surveillance).
The 2 re-dislocations were again revised using the same implant
Av age 66.5 (36 – 84), Av n° dislocations 2.8 (1 – 10), Av follow up 25.2 months, none lost to view