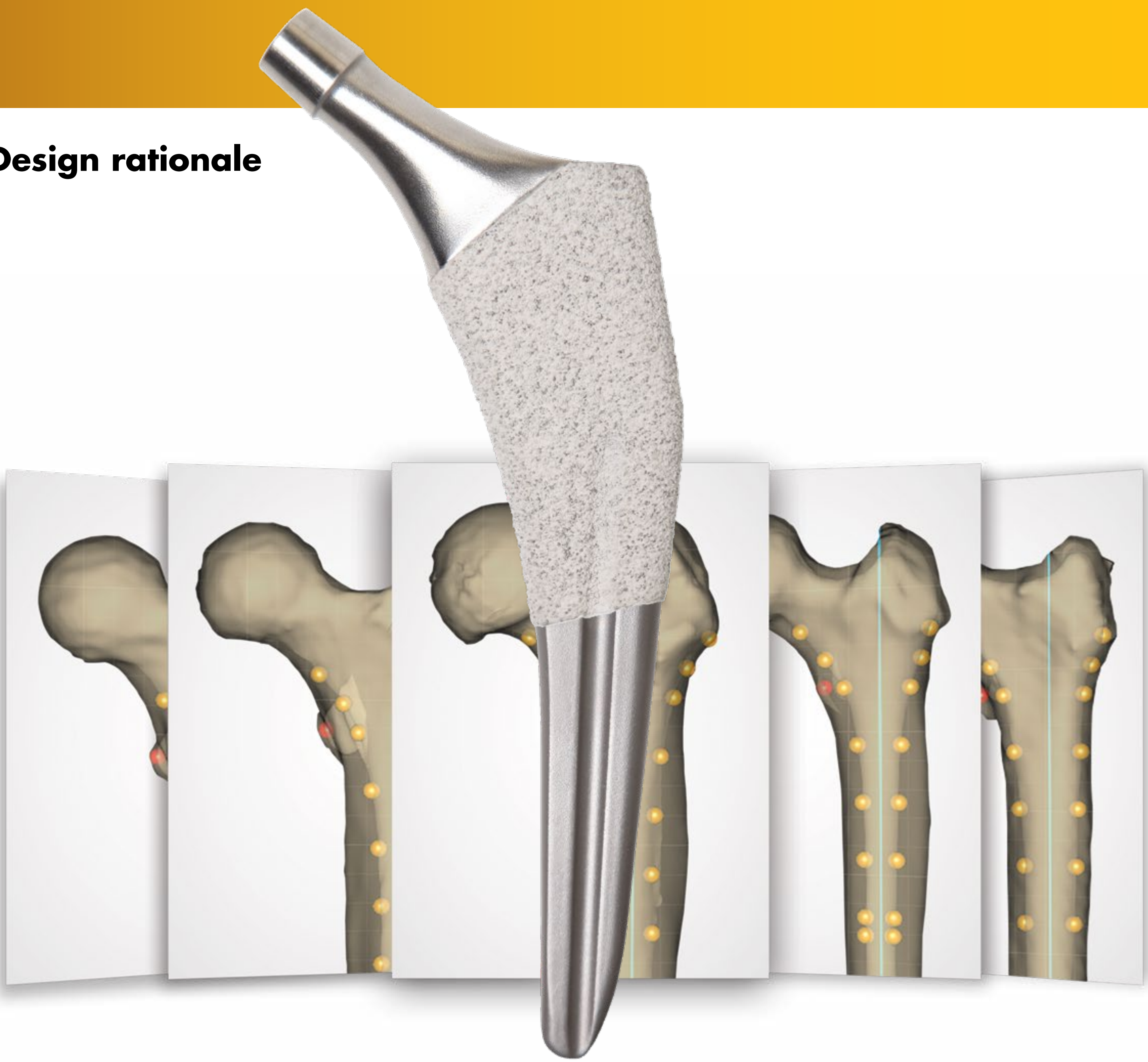
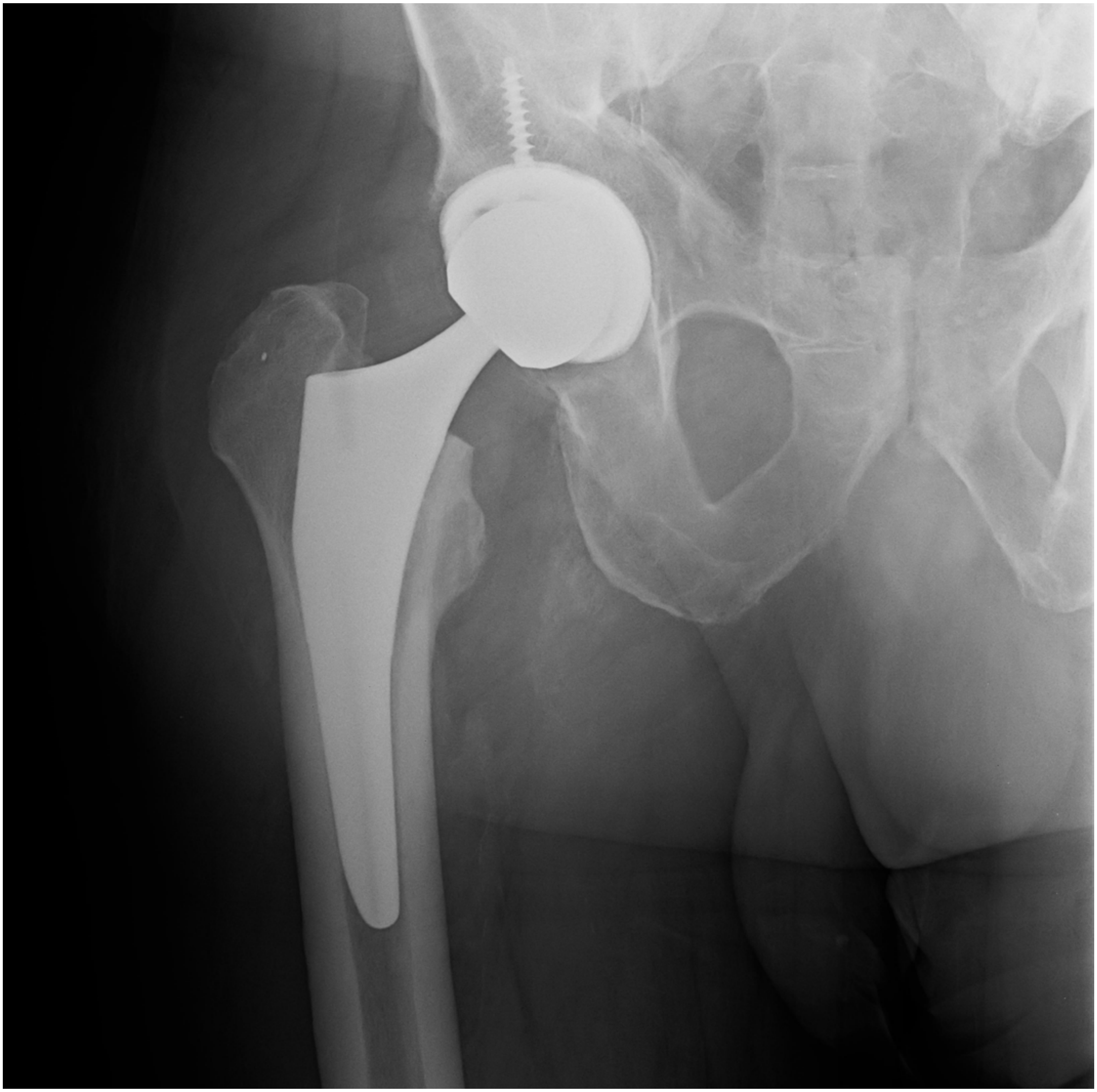
Accolade® II
Femoral Hip Stem

Design rationale



Designed to fit more patients, designed to fit your approach.



Addressing modern demands with innovative technology.

The global THA population is evolving to include a younger,[1] more active[2] and more demanding[3] patient. Many femoral stem designs on the market today predate the emergence of this novel demand. Subsequently, an opportunity to enhance the conventional femoral stem design exists.

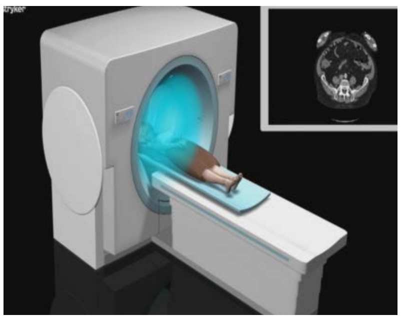
Conventional tapered wedge femoral stems have achieved popularity due to their simplicity and solid clinical results.[4,5] Despite these results, literature indicates that there are still unmet clinical needs.[6,7,8] Incidence of subsidence,[6] distal-only implant engagement[7] and periprosthetic fracture[8] suggest a clinical need for an improved implant fit for this novel patient population.

Stryker, along with key industry leaders, committed to developing an innovative femoral stem. This design would build from the sound principles of tapered wedge philosophy to meet the unique needs of the current patient population. At the heart of this development was a unique technology called Stryker Orthopaedic Modeling and Analytics, or SOMA. As a system that enables population-based design, SOMA has functionality with which to design, model and analyze novel orthopaedic devices.

Stryker utilized SOMA technology to design an innovative stem building upon the conventional tapered wedge femoral design, incorporating unique features to allow for an enhanced implant fit in today's patient population.[9] By establishing an increased canal fit and fill,[9] Accolade II has been shown to allow for improved stability,[10] decreased intraoperative femoral fractures,[11] as well as very good survivorship and functional outcomes,[12,13] ultimately leading to satisfied patients.[13,14]

SOMA technology

Utilizing the proprietary SOMA technology, Stryker was able to complete one of the largest proximal femoral bone morphology studies ever undertaken.[13] An illustrated look at the process by which SOMA technology is employed in implant design is described below.

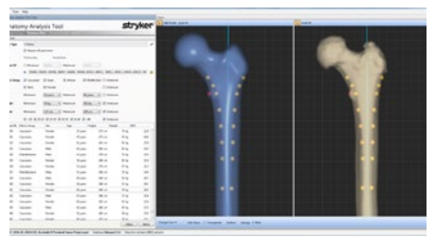


CT acquisition

The SOMA database continues to acquire new CT scans and currently contains over 26,000 bones[25]

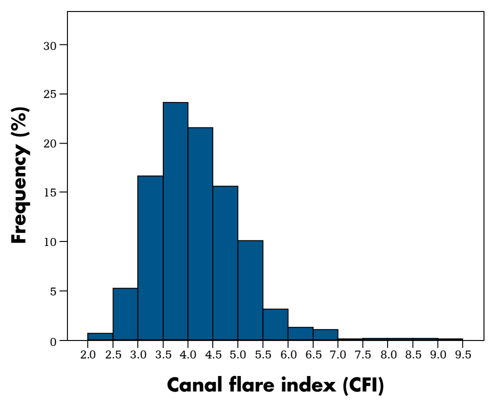
Segmentation

Once acquired, all bones are segmented into inner and outer cortices



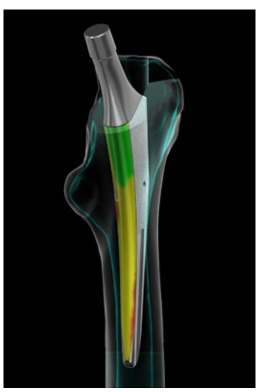
Analysis

Using SOMA tools, bone morphology can be studied in a highly accurate and reproducible manner



Design input

The results of these studies, such as the population canal flare index, can be utilized in implant design



Validation

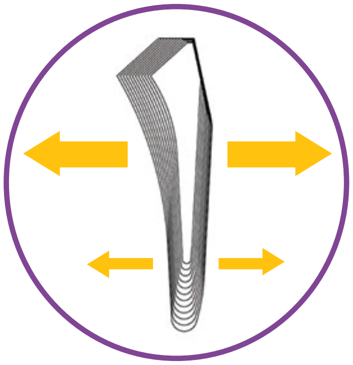
The resulting implant design can then be validated using SOMA fitting tools

Three key SOMA-designed features

Bone morphology data allowed Stryker an unprecedented look at femoral anatomy and assisted in the design of an innovative femoral stem. The SOMA input* was instrumental in the establishment of three key design features of Accolade II:

Unique size-specific medial curvature

increasing proximal conformity to improve primary stability[14,15]



Enhanced proximal-distal proportions[16]

shown to mimic canal anatomy to avoid distal-only engagement and achieve cortical fit[8,16]

Optimized stem length**

enables muscle-sparing approaches without sacrificing stability[15,17]

*SOMA design of Accolade II based on 556 CT scans

**Optimized stem length for a broad range of patients based on average femoral bone shape of 556 CT scans

Unique size-specific medial curvature

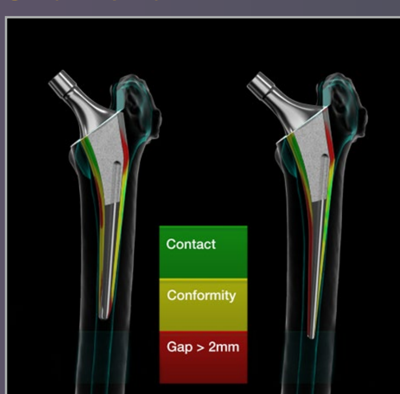
Initial stability is critical to long-term implant performance.[6] Early subsidence and micromotion have been established as strong indicators for implant failure.[6] Initial stability may be increased by creating a higher conformity between the implant and the femoral cortices, leading to a larger area of contact.[19]

Analyzing the SOMA morphology study data,* it was observed that a constant medial curvature may not allow for a conforming canal fit throughout varying femoral size.

This population-based input influenced Accolade II to incorporate the market's first unique size-specific medial curvature. This feature was designed to enable a more conforming proximal cortical fit,[15] which has been shown to allow for improved implant stability.[19]

Using femurs from the SOMA database,* fit patterns of Accolade II can be compared to conventional tapered wedge designs. The three examples below illustrate how Accolade II achieves a more conforming canal fit throughout varying bone sizes.

Small femur



Accolade II | Conventional tapered wedge

Medium femur

Accolade II | Conventional tapered wedge

Large femur

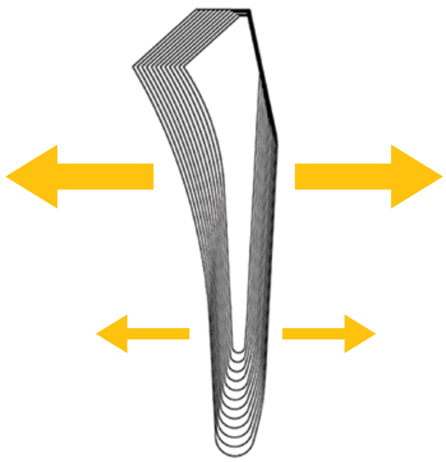
Accolade II | Conventional tapered wedge

*SOMA design of Accolade II based on 556 CT scans

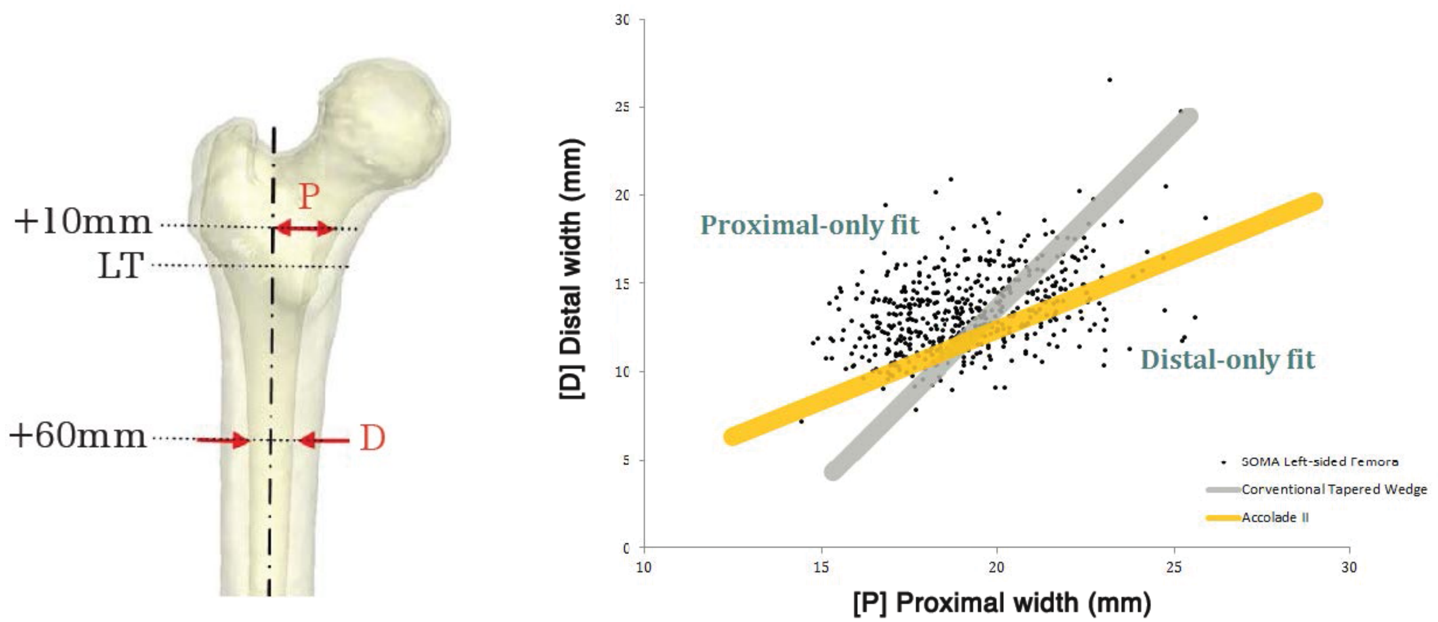
Enhanced proximal-distal proportions

Distal-only engaged femoral stems can experience stress shielding,[19] and consequently may lead to elevated failure rates due to loosening and migration.[9] In order to better mimic the femoral anatomy and avoid distal-only engagement, a more anatomic implant growth rate is needed.

Utilizing the SOMA femoral morphology study,* a more anthropometric proximal-distal stem growth rate was identified. This rate led to enhanced implant proportions,[13] as the distal geometry of Accolade II increases in size less than the proximal geometry. These proportions enable Accolade II to achieve a significantly better canal fit and fill[9] and have shown a decreased incidence of distal-only engagement.[9]



Comparing implant fit



In the graph above, the proximal (P) and distal (D) measurements of a population of 556 femurs were plotted (black dots) against the corresponding stem diameters of Accolade II (gold) and a conventional tapered wedge design (gray). Accolade II achieved more fully conforming and proximal-only fit types compared to the conventional design, while subsequently **reducing distal-only fit by 14%**.[16]

*SOMA design of Accolade II based on 556 CT scans

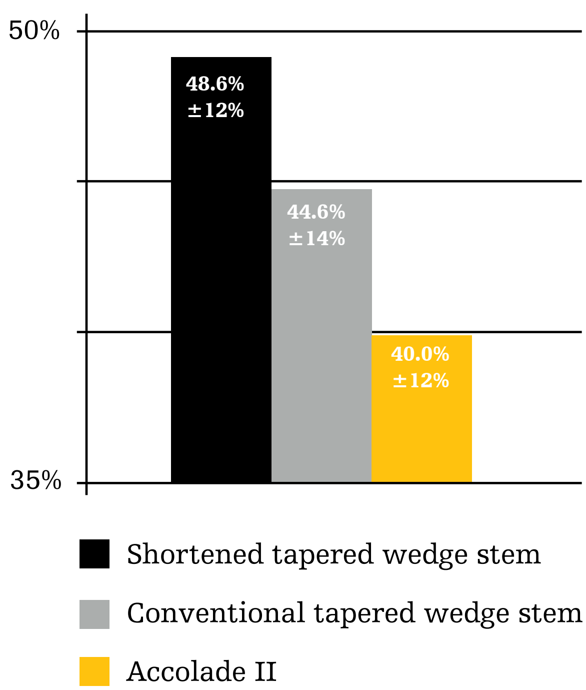
Optimized stem length*

Popularity of muscle-sparing approaches and bone-conserving fundamentals have led to a trend in shortening of stem length.[20] However, there is a complex relationship between stem length and implant stability.[20] Shortening stem length without geometry optimization has been shown to increase the potential for micromotion,[20] which is a strong indicator for implant failure.[6]

Accolade II utilized the SOMA database** and stability analyses to establish an optimized length for each stem size, which not only accommodates muscle-sparing approaches,[20] but demonstrates improved initial stability.[10]

"Simply shortening a standard tapered wedge design may reduce the primary stability."[17]

Mean % of HA-coated stem surface that experienced micromotion >50 μm[17]



*Optimized stem length for a broad range of patients based on average femoral bone shape of 556 CT scans

**SOMA design of Accolade II based on 556 CT scans

Designed to fit your approach

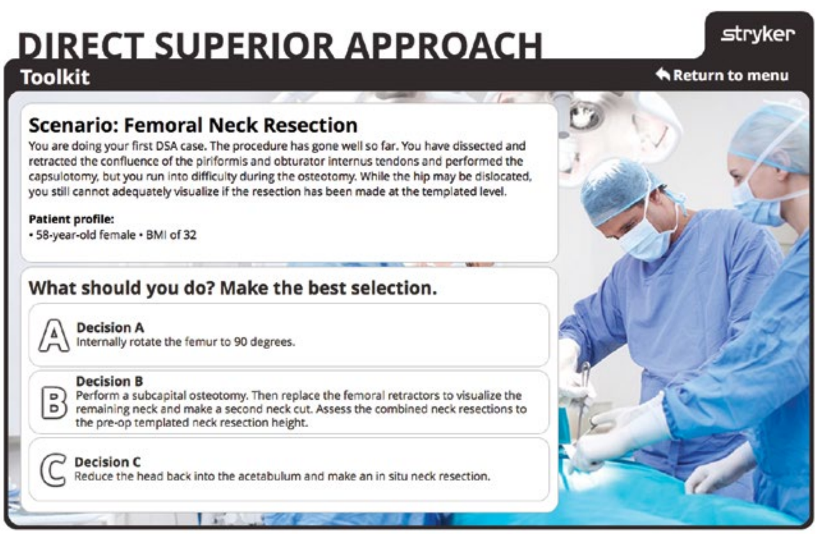
Muscle-sparing surgical approaches continue to gain popularity due to the potential patient benefits of faster recovery,[21,22] less pain[21,22] and greater satisfaction.[23]

Stryker's portfolio of muscle-sparing techniques features modern instrumentation and dynamic Medical Education programs to support the **Direct Anterior Approach** and the **Direct Superior Approach**.

The Direct Superior Approach was designed for surgeons who prefer the fundamentals and familiarity of the posterior approach, but seek to provide the next evolution in muscle-sparing THA surgical techniques for their patients.

Stryker has developed Stryker's Training Academy, a training platform to help surgeons manage the learning curve of a new surgical approach.

For access to Stryker's Training Academy, contact your local Stryker Sales Representative.



Clinical performance

"Significantly better overall canal **fit**"[9] than conventional tapered wedge design

over

1,000,000

implanted worldwide[24]

100%

maintenance of bone mineral density

at the medial calcar at two years[26]

100%

aseptic survivorship

demonstrated in a midterm study[12]

less than

0.1 mm

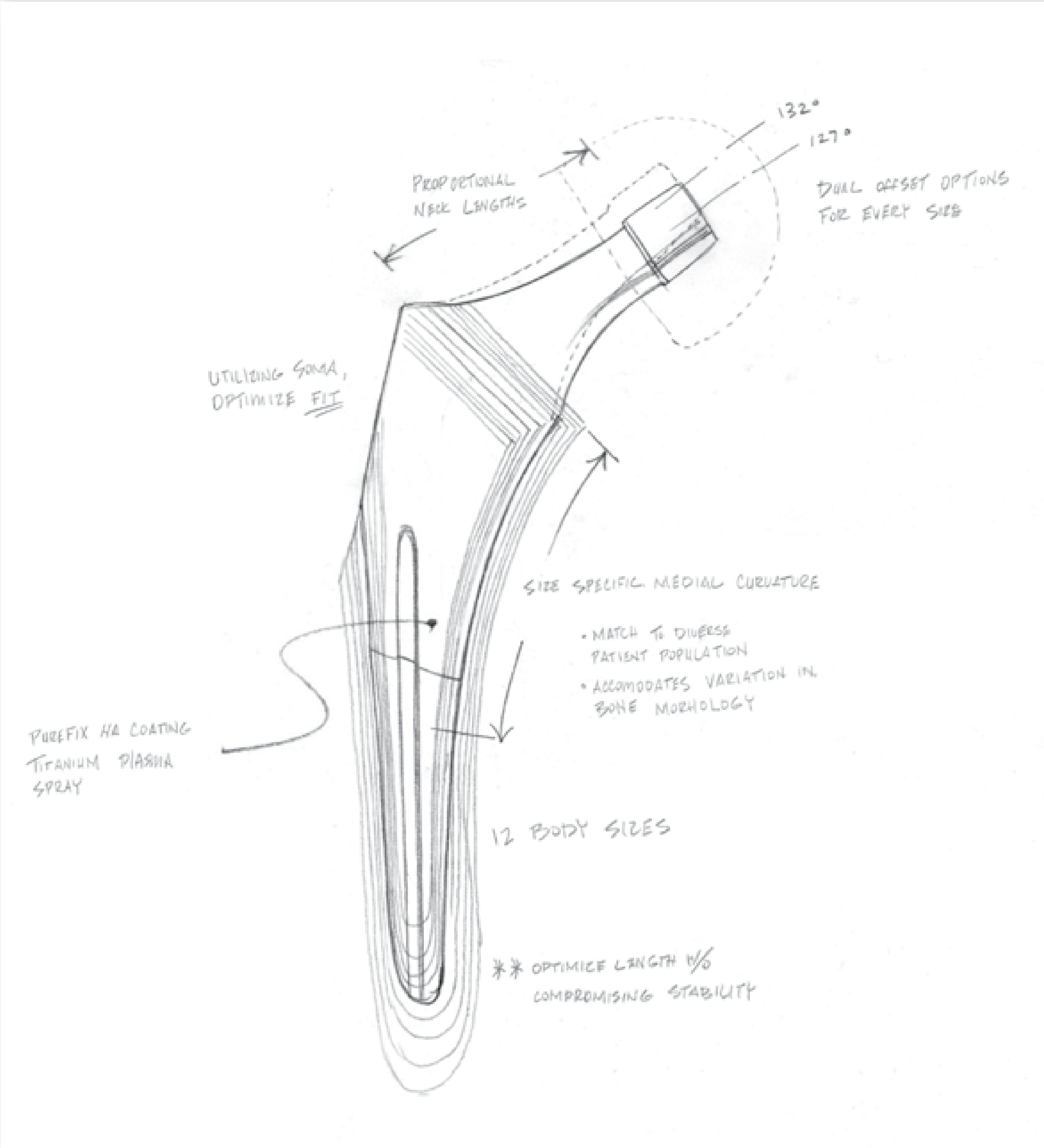
subsidence

observed in a two-year RSA study[10]

7.5x

fewer intraoperative fractures

observed compared to conventional tapered wedge[11]


132°
127°
PROPORTIONAL NECK LENGTHS
DUAL OFFSET OPTIONS FOR EVERY SIZE
UTILIZING SOMA, OPTIMIZE FIT
SIZE SPECIFIC MEDIAL CURVATURE
• MATCH TO DIVERSE PATIENT POPULATION
• ACCOMODATES VARIATION IN BONE MORHOLOGY
PUREFIX HA COATING
TITANIUM PLASMA SPRAY
12 BODY SIZES
** OPTIMIZE LENGTH W/O COMPROMISING STABILITY

stryker

Accolade II Implant catalog numbers

Part number	Size	Neck angle
6720-0027	0	132°
6720-0127	1	
6720-0230	2	
6720-0330	3	
6720-0435	4	
6720-0535	5	
6720-0635	6	
6720-0737	7	
6720-0837	8	
6720-0937	9	
6720-1040	10	
6720-1140	11	

6721-0027	0	127°
6721-0127	1	
6721-0230	2	
6721-0330	3	
6721-0435	4	
6721-0535	5	
6721-0635	6	
6721-0737	7	
6721-0837	8	
6721-0937	9	
6721-1040	10	
6721-1140	11	

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Joint Replacement

A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

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