

*Understanding  
Alternative  
Bearing Surfaces  
in Total Hip  
Replacement*



If you need a hip replacement, you and your doctor may be discussing what kind of hip implant is the best choice for you. That decision will depend on factors such as your age and your level of activity. As you may know, hip replacement surgery has been clinically successful for many years. Today, the materials used in total hip replacement implants are further improved. Following is information meant to help you understand the improvements in total hip replacement implants.

### **What hip implants are available today?**

The success of total hip replacement depends in part on the materials, design and processing of the materials used in the implant. To duplicate the action of a ball-and-socket hip joint, an implant has 3 parts:

- The stem, which fits into the leg bone, usually made from metal
- The ball or head, which replaces the sphere-shaped head of the leg bone, made of ceramic or metal
- The shell and accompanying liner, which replaces the worn out hip-socket, with the shell made of metal and the liner made of a plastic called polyethylene. This liner may also be made of ceramic or metal.

increase hip motion. It is critical to allow as much flexibility as possible to surgeons when making implant decisions in the operating room and *Longevity* Highly Crosslinked Polyethylene provides these important liner options.

## Liner Choices

<i>Longevity</i> Highly Crosslinked Polyethylene	Ceramic -On- Ceramic	Metal -On- Metal
Standard ID	Standard ID	Standard ID
10° Elevated Rim	Large ID	Large ID
20° Elevated Rim		No
7mm Offset		Other
Large ID		Choices
10° Elevated Rim Large ID		Exist in
Oblique*		These
Eccentric*		Bearing
Constrained*		Surfaces

\*not currently available in *Longevity* Highly Crosslinked Polyethylene

## Why are options for surgeons needed?

*“Providing options to surgeons when they are choosing implant liner designs, head sizes or neck lengths is important for patients in terms of optimizing overall joint stability.”*

Dr. William J. Maloney,  
*Professor of Orthopaedic Surgery and Chief of Orthopaedic Surgery Services, Barnes Jewish Hospital and Washington University School of Medicine, St. Louis*

Eventually, bearing surfaces may wear out and need replacement. Wear is defined as the progressive shedding of minute amounts of material from the implant. Alternative bearings are those that are considered highly wear-resistant and are an “alternative” to conventional polyethylene, which have traditionally had higher wear rates. Today’s bearing surfaces are the result of ongoing research to develop materials that resist wear better and last longer.

*Longevity*  
Highly Crosslinked  
Polyethylene Surface



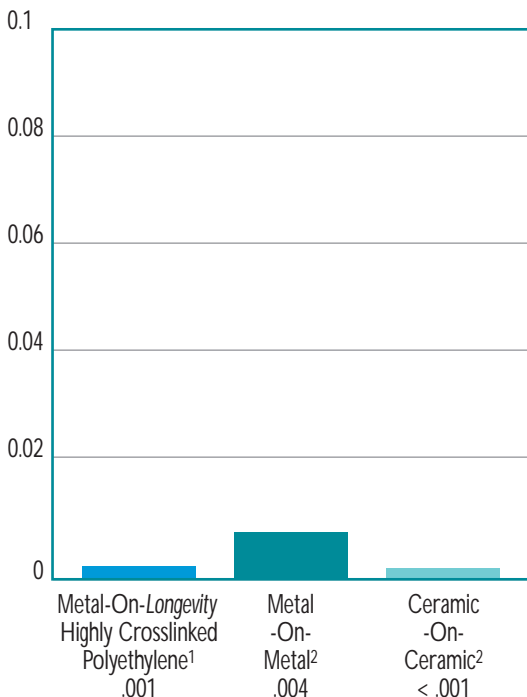
## **How has polyethylene improved to optimize wear resistance?**

A major improvement in polyethylene is “crosslinking.” Clinical studies have shown that, generally, the higher the level of crosslinking, the greater the improvement in wear resistance. Zimmer’s highly crosslinked polyethylene is produced using harmless high-dose electron beam radiation, which further links together the molecular structure of the polyethylene. In crosslinking, a new three-dimensional structure is created that results in a polymer

more resistant to wear. *Longevity*<sup>®</sup> Highly Crosslinked Polyethylene was developed by Zimmer to address the issue of wear in total hip replacement.

## Linear Wear (Laboratory Testing)

mm/million cycles



1. Data on file at Zimmer, Inc.

2. Fisher J, Besong AA, Firkins PJ, et al. Comparative wear and debris generation in UHMWPE on ceramic-on-ceramic, metal-on-metal, and ceramic-on-metal hip prostheses. 46th Annual Meeting, Orthopaedic Research Society, March 12-15, 2000.

## How do the alternative bearing materials compare in terms of wear resistance?

Laboratory studies have been conducted to measure the wear resistance of the following alternative bearing surfaces:

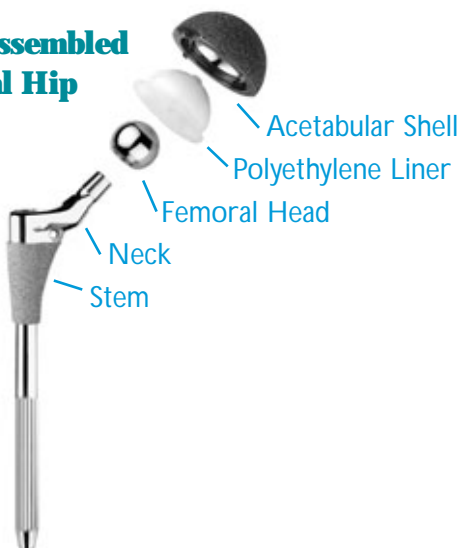
- Metal-on-Metal
- Ceramic-on-Ceramic
- Metal or Ceramic-on-*Longevity*  
Highly Crosslinked Polyethylene

These studies have shown that these materials are substantially equivalent in their ability to resist wear. Again, wear is an important factor in limiting the service life of an implant.

### **If implant wear rates are similar, how do I know what product type is right for me?**

While these alternative bearing surfaces all have low wear rates, the differences are in the ability to provide options for surgeons. Choices in liners, neck length, head size and the positioning of the implant components are vital in meeting different patient needs. Neck length is important to restore proper leg length in patients, while head size options help to

### **Unassembled Total Hip**



Materials for implants in hip replacements have been available for more than 20 years and include:

- Ceramic-on-Polyethylene  
(referring to a ceramic head rotating on a polyethylene liner)
- Metal-on-Polyethylene
- Ceramic-on-Ceramic
- Metal-on-Metal

Improvements are continually being made in all these materials. For instance, while early ceramic implants tended to chip and break more easily, they now have dramatically lower fracture rates. Second-generation metal-on-metal products were developed to address problems such as loosening of the ball-and-socket components. Polyethylene has been the dominant bearing surface for many years. Highly crosslinked polyethylene, an advancement in this material, is now one of the preeminent alternative bearing materials available today. This advanced material is highly wear-resistant. It also offers flexibility and options for surgeons not found in other liner materials.

### **What factors can limit an implant's service life?**

There are many considerations facing patients and surgeons when choosing implants for hip replacement. While the vast majority of hip replacement surgeries are successful, in the small number that are revised, wear is an important factor.



## **Why would I choose *Longevity* Highly Crosslinked Polyethylene?**

Your surgeon can help you determine if *Longevity* Highly Crosslinked Polyethylene is the best choice for you based on:

- Wear resistance of an alternative bearing surface
- Multiple options for surgeons, meeting different patient needs

**For further information, patients are advised to ask their surgeon, or visit [www.pacewithlife.com](http://www.pacewithlife.com)**



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*Individual results may vary. This information is intended to provide an overview of alternative bearing surfaces in hip replacement surgery. Review this information with your doctor. Joint replacement surgery is usually a last option after all treatments have been exhausted.*