

# Imaging Benefits Across Trauma Patient Care

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The imaging characteristics of PEEK-OPTIMA™ Ultra-Reinforced offer numerous benefits intraoperatively and throughout the healing process. Implants composed of a composite of carbon fiber and PEEK-OPTIMA Polymer are radiolucent, providing surgeons 360° fracture visibility during and after surgery. This enhanced visibility enables better, safer, and quicker procedures and increased confidence in returning patients to load-bearing activities.

## OR Improvements with Potential Cost Reduction

### Better Procedures

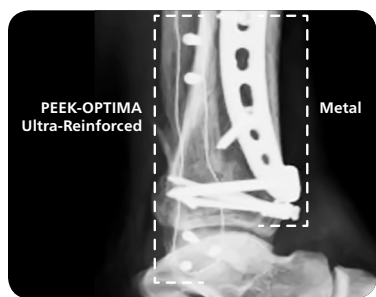


Photo courtesy of Joshua Niemann, M.D.

Unimpeded visibility of the fracture can help surgeons ensure proper alignment. In 11 publications reporting on implantations of carbon fiber based PEEK implants for fracture treatment, all discuss more

accurate assessment of fracture reduction due to the implant radiolucency.<sup>1-11</sup> More specifically, in a study of 17 proximal humerus fractures, reduction accuracy was assessed as anatomic or near-anatomic in all cases, with the only exception in cases where the deforming forces precluded an anatomic reduction.<sup>5</sup>

### Safer Procedures

With the two cortices visible in all radiographic planes, the risk of adverse events during surgery can be reduced. In three publications of proximal humerus fractures, there were no primary screw perforations.<sup>5,8,9</sup> This non-occurrence may be attributed to the radiolucency of the plate, as the rate of screw perforation in metal plates ranges from 1-12%.<sup>12,13</sup>

As a benefit to healthcare workers, the ease of visualization may reduce radiation exposure. A case series of proximal humerus fractures demonstrated that the PEEK-OPTIMA Ultra-Reinforced plates required less than 1.35 minutes of fluoroscopy on average<sup>5</sup> compared to an average of 1.4 to 6.4 minutes for metallic plates.<sup>13-15</sup>

### Quicker Procedures

Enhanced visualization may reduce surgical times, leading to reduced cost of the overall procedure. A distal fibula case series demonstrated an 18% reduction in surgical time for tri-malleolar fractures.<sup>2</sup>

## Increase Confidence to Progress Patients Through Recovery

In addition to the benefits provided intraoperatively, the improved visualization offers benefits throughout the healing process. Surgeons can gain better visibility of fracture healing during follow-up visits and increase confidence in returning patients to function quicker.

“How quickly do you let them walk on it? How quickly do you release them from their sling or brace and start working towards their daily life, and their original function? With better visibility, you get better assurance that what you’re seeing is what you’re really seeing, and you can progress people a little faster.”\*

- Joshua J. Neimann, MD<sup>16</sup>  
Liberty Orthopedics, Liberty, MO

## Benefits in Tumor Treatment

The imaging characteristics over the follow-up period are particularly advantageous in the treatment of pathologic or impending fractures due to bone tumors, especially when local adjuvant radiotherapy is indicated. The adjuvant radiotherapy is often critical in reducing the risk of local disease progression, and its success depends on the accuracy of target identification and dose prescription. Traditional titanium or stainless steel implants can obstruct the postoperative surveillance imaging, particularly in areas adjacent to the implant, making it more challenging to detect recurrent disease, and increase inaccuracies in radiotherapy dosing.

In a comparative analysis of titanium and carbon fiber PEEK nails, the carbon fiber PEEK nails had significantly less MRI and CT artifact, allowing for greater visualization of the anatomic areas adjacent to the implant.<sup>17</sup> In two studies comparing carbon fiber reinforced (CFR) PEEK devices with titanium alloy devices, the difference between measured and calculated doses demonstrated a maximum overdose of 10% and underdose of 20% to 30% for the titanium alloy implants. For CFR-PEEK implants, the differences were within 0-5%.<sup>18,19</sup>

## Conclusion

The use of osteosynthesis devices composed of PEEK-OPTIMA Ultra-Reinforced offers benefits across the continuum of patient care. Intraoperatively, the 360° fracture visibility can improve functionality, may be better and safer for the patient, and has the potential to reduce surgical time. The unobstructed imaging makes it easier for surgeons to assess healing with the potential to progress patients a little quicker. For patients needing follow-up MRI or CT diagnostics, the artifact-free imaging improves visualization of surrounding tissues. In cancer patients, monitoring for disease progression or recurrence is easier and radiotherapy dosing has been shown to be more accurate. The benefits of the radiolucency extend beyond just an easier surgery, and have the potential to provide benefits to the surgeon, hospital system, and ultimately, patients from initial surgery through the healing process. ▲

## ABOUT THE AUTHOR

### Sherri Gambill

Sherri (Wykosky) Gambill is currently Trauma Technology Manager at Invibio Biomaterial Solutions where she is responsible for product development. Previously, as Business Development Associate she maintained relationships across client organizations as they adopted new biomaterials. Prior to Invibio, Sherri was a Product Development Engineer at DePuy Synthes and BD Ophthalmic Systems, where she designed and developed implants and instrumentation for orthopaedic trauma and glaucoma treatment. In 2006, Sherri received a Bachelor of Science (BS) degree in Bioengineering at the University of Pennsylvania in Philadelphia, PA, USA.



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\*The testimonial presented has been provided by a practicing orthopedic surgeon. His view and experiences are his own and do not necessarily reflect those of others. "Invibio" disclaims any liabilities or loss in connection with the information herein.

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