Preface: Long-Term Effects of Musculoskeletal Tissue Scaffolds

More than a year ago I was invited to be a guest editor for this journal. The editor, Dr. Subrata Saha, was seeking a series of articles that would be of interest to orthopaedic clinicians. Over the past 2 decades, I have followed musculoskeletal scaffold development with enthusiasm and have been disappointed that so few have come to commercial use. Therefore, I set out to invite a series of articles on what was known about the potential long-term effects of scaffolds for bone, cartilage, menisci, tendons, and ligaments.

In preparing for this series, I was surprised find so few clinical applications of musculoskeletal scaffolds. This is, in part, why there is limited information regarding the long-term effects of scaffolds on both graft and surrounding tissues. Given that tissue-engineering scaffolds for bone have been under study for 3 decades, it is remarkable that so few are in clinical use. Bone voids must be bridged by orthopaedic hardware until bone substitution in any graft construct occurs. To date, scaffold-based applications are limited, despite the hundreds of millions of dollars spent on bone scaffold research alone.[1]

The number of PubMed-listed scaffold papers for bone, cartilage (meniscus embedded in that), and tendon is striking. The ligament literature count is difficult because dental ligament papers are included. Likewise, skeletal muscle scaffolds are difficult to sort out from cardiac muscle scaffolds. Figure 1 depicts the immense number of papers found in the PubMed database. It is interesting to note that the growth in papers is almost even for 2010 and 2011. To date, commercial scaffolds for clinical applications in specific regions of bone and for articular cartilage use collagen and hyaluronan for matrix-induced articular chondrocyte implantation. However, no long-term human studies on the effects of these scaffolds on the implanted or surrounding tissue are available.[2] No clinically implantable meniscal scaffolds have come to clinical use.[3] Although there are collagen-based graft materials for augmentation in tendon and ligament repair, there are no commercially available tissue-engineered scaffolds.

The papers in this series highlight many of the materials that have been studied. Most point to some of the long-term effects and how materials have been modified to create the most appropriate construct.

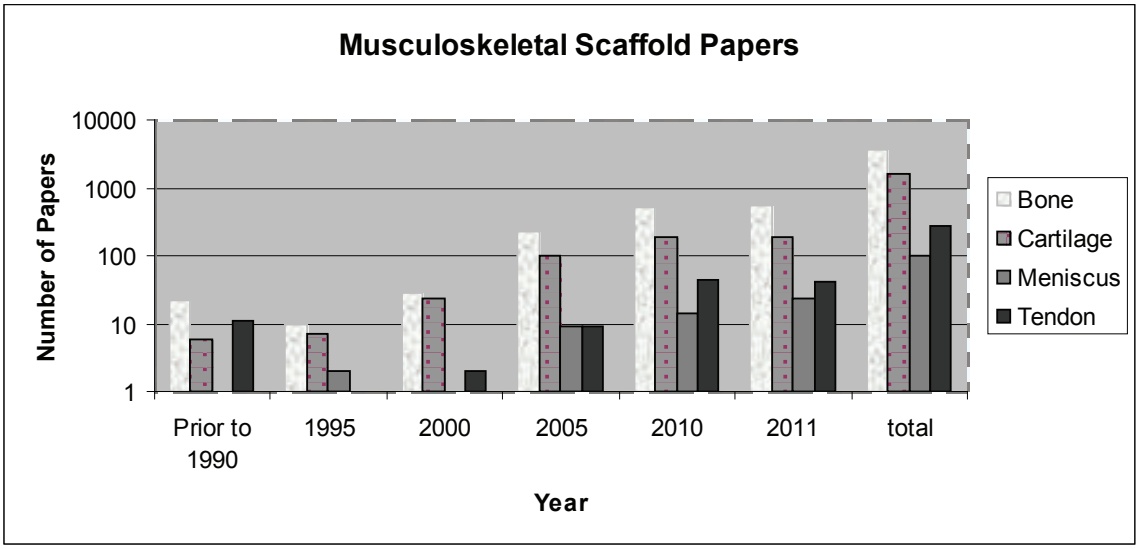

FIGURE 1. Number of papers for musculoskeletal scaffolds per year group.

As suggested by Hollister, the road to clinical applications will be paved in "envisioning and engineering scaffolds as modular systems with a sliding scale of complexity."[1] The purpose of the series is to review the diverse types of scaffolds, their requirements for effective tissue engineered constructs *in vivo* and *in vitro*, and what is known about the long-term effects of these scaffolds on the tissue-engineered construct as well as the surrounding tissues.

REFERENCES

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