

## **Kharma C. Foucher, MD, PhD**

The last NIH gait analysis workshop was held the year I started grad school. In reflecting on the developments in the field since that time, I am impressed by what has changed and what has not, particularly in my area, adult orthopedics. Motion analysis technology and computing has improved such that we can offer much more sophisticated information and faster, more detailed musculoskeletal models to analyze and characterize various orthopedic conditions or problems. Unfortunately there still exists a palpable communications gulf between surgeons and the biomechanics research community in this area. Gait analysis is still underutilized clinically and research does not always focus on issues that will directly affect patient outcomes. Motion analysis is space-intensive and expensive; unless we find ways to make ourselves indispensable to patients, surgeons, and the health care system of the future as a whole – in whatever form it takes – there is a real risk of our labs being phased out when our departments need to make difficult budget decisions. I believe solutions lie in three areas, “marketing”, “listening” and “culture”.

**Marketing:** I think that increasing the use of motion analysis for clinical decision making and evaluation in adult orthopedics would lead us naturally to better research questions. I think we can accomplish this with **marketing, outreach, and education** directed at both surgeons and the general public. The public is already very receptive to news about motion analysis when our findings are publicized. When targeting surgeons, however, we need to have a better answer to the hypothetical question: “How could objective motion analysis possibly improve my clinical outcomes? My patients already do very well after surgery.” **Recommendations:** 1) Launch an organized campaign to increase awareness of the benefits of both clinical motion analysis and biomechanics research in orthopedics. This could be done through strategically timed mailings to orthopedic practices through our professional societies, followed by individual outreach at our own institutions, and targeted advocacy submissions to clinical journals (i.e. review articles about specific ways that motion analysis has advanced clinical practice). 2) Educate clinical staff about billing and coding issues to remove practical barriers to ordering gait tests. 3) Increase public awareness such that patients begin to actually ask their doctors to incorporate biomechanical data in their decision-making. We can do this by making better use of our institutions’ media relations departments to promote our work directly to potential patients.

**Listening:** Research findings often lag clinical opinion, i.e. we often “prove” what clinicians already believe. We also too often pursue questions that are scientifically and intellectually interesting, but that do not affect patient care. We spend too much of our time developing better ways to characterize disorders or applying improved technology to old questions. Not enough time is spent developing and evaluating treatment solutions. While I am not a surgeon, I think that as biomechanics researchers we should be thinking more like surgeons! Clinical developments are often driven by patient demand. Research priorities should also be set with patient concerns in mind. We first need to do a better job of **listening** to patients (through better communication with surgeons, physical therapists, and each other) so that we can identify the most pressing research questions. As discussed above, improving utilization of clinical gait analysis would also be helpful. **Recommendations:** 1) Work directly with surgeons to identify both clinically important research questions and clinically useful biomechanical outcome measures. 2) Develop standard protocols and output formats so that the type of data that a surgeon can order at the center where s/he trains is the same data that is available at the center where s/he ultimately practices. 3) Accelerate the pace of research so that our findings lead, not lag, the clinic. A portion of NIH research dollars could be designated for shorter focused studies with direct clinical applications. The R03 and R21 can theoretically be used for this purpose, but these mechanisms are more often used to collect pilot data and/or launch larger lines of research.

**Culture:** Finally, I think that as a community we should discuss whether the current culture of research always serves our common goal – improving patient care by getting our biomechanical research innovations to the bedside. While competition for NIH funding and space in top journals should ensure that only the best studies move forward, the “system” promotes the formation of cliques and rivalries. Sometimes collaboration, rather than competition would result in better patient outcomes. **Recommendations:** In specific areas, the NIH should establish ways to encourage groups who are not active collaborators but are working on similar questions or who work with similar subjects and methods to combine forces by pooling data or other resources. Larger multi-center or multi-faceted studies would give faster answers with fewer of the statistical power and “generalizability” concerns that often plague orthopedic biomechanics research.