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Dear Dr. Katz:

The American Academy of Orthopaedic Surgeons (AAOS), representing over 17,000 board-certified orthopaedic surgeons and researchers, welcomes the opportunity to respond to the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) call for comments regarding the development of its strategic plan for fiscal years 2010-2014. The AAOS applauds your decision to seek input from the scientific community.

As you are aware, musculoskeletal conditions are among the most disabling and costly conditions suffered by Americans. In 2005, musculoskeletal medical conditions were self-reported by 107.67 million adults in the U.S. in the National Health Interview Study (NIHS), which represents nearly one in two persons ages 18 and over (of the estimated 2005 population). Musculoskeletal conditions are also the greatest cause of total lost work days and medical bed days. One in six persons employed in the previous 12 months reported lost work days --- totaling nearly 437.6 million days as a result of debilitating musculoskeletal conditions.

As the population ages over the coming years, the number of people with these conditions will increase, as they are most prevalent in the older population. In fact, by 2030, the number of individuals in the U.S. ages 65 years and older is expected to double, with individuals aged 85 and older the most rapidly changing segment of society.

Per your request for comments, below are the official AAOS responses to your questions:

1. List the top three research advances within the past five years:

1. Fat (leptin) regulation of bone mass and converse bone regulation of energy metabolism;
2. Detailed identification of the role of the WNT signaling pathways for Osteogenesis - sclerostin, Dkk, etc.; and
3. Research in underutilization of total joint arthroplasty and related gender difference.

2. List the most promising areas of science:

- Interplay between various organ systems (e.g. statins affect cardiovascular and bone; consideration of the body as a whole, energy metabolism and bone);
- Tissue regeneration;
- Imaging to predict risk of fracture;
- Identification of factors beyond BMD for prediction of fracture risk;
- Development of anabolic agents for treatment/prevention of osteoporosis;
- Use of adult stem cells for specific tissue;
- Molecular therapies for treating disease;

- Investigation of sex and gender related differences in musculoskeletal diseases and impairments; and

3. List the most pressing scientific and training needs:

- Promotion of interdisciplinary collaborations to drive research advances;
- Training to provide basic skills in complementary fields;
- Understanding which can lead to better collaboration between basic and translational research --- clinical perspective needs to be considered and valued for research relevance and clinicians need to value and understand basic science;
- Translational research directed towards new treatment;
- Protected research time for clinician scientists;
- Training of clinician scientists --- Maintain the flow of young investigators into biomedical research;
- Development of scientific interest at very young age to foster the research pipeline;
- Research that directly impacts patient outcomes and study groups that represent the diversity of the US population (sex, gender, culture, age),
- Development of relevant and practical outcome measures and surrogates;
- Non-invasive measurements of bone quality that at a minimum provide insight into matrix geometry, architecture, and collagen and help predict risk of fracture;
- Identification of proteins associated with complex traits of metabolic bone disease and skeletal dysplasias;
- Understanding the mechanism of osteolysis and design of devices that will avoid this problem;
- Prevention and reversal of osteoporosis and osteoarthritis; and
- Limb regeneration.

4. List the greatest challenges to research progress and the potential options for overcoming these challenges:

- Industry Funding: Encouragement between industry and government oversight so that education and research can continue funding through industry support;
- Increase multi center trials and develop trials which include adequate representation of women and children;
- Technology: Development of affordable advances for patients and non-teaching institutions;
- Language: Improved basic/medical language courses for practicing surgeons;
- Funding: Ability to attract and retain talented and well trained individuals and promotion of alternative research funding at the pre- and post-doctoral level + fellows to preserve the research workforce;
- Increasing the pool of clinician scientists: protection of research time and the encouragement to do so from the chair at academic sites;
- Difficulty in organizing, managing, conducting prospective outcome studies (also difficulty in blinding in surgical specialties). Maintaining technological literacy and continuing education in all scientific and clinical fields;
- Collaborations: Promotions of inter-disciplinary research between highly specialized fields; and
- Expansion of knowledge base: Difficulties for investigators working in multidisciplinary fields should have access to a summary rating of new research advances, as no tool exists as such.

5. Describe what gaps in training have delayed progress in critical research areas:

- Improved collegiate level academics: Biology/medical students lack both knowledge and training in quantitative reasoning, study design, and statistics ---- imperative to have these graduates proficient in the fundamental knowledge of analytical mathematics and study design;
- Lack of education around the pathophysiology of common and costly diseases of quality and the musculoskeletal system and intense musculoskeletal education in medical schools and clinician -scientist programs;
- Language/cultural barriers;
- Lack of incentives to clinician scientists --- having young researchers become interested enough to pursue research and science despite current economic and funding climate (which contributes to a lack of translational science); and
- Basic science training for all clinicians.

6. Please provide any additional information you think would be useful to the NIAMS long-range planning process, either in general, or with respect to a specific disease area:

- Training at the medical/graduate school levels (and at the research level) that stresses that sex and gender create vast differences in diseases, and consequent responses to diseases and therapies are different, and that cells derived from males and cells derived from women do not behave the same way;
- Improve the bone quality consistently rather than new metallurgy/anchoring technology; and
- Focus on the burden of disease: need for research in osteoarthritis, as it affects 30 million people in the US alone, many of whom are women.

The AAOS is appreciative for the opportunity to provide feedback. We look forward to our continued dialogue and partnerships with the NIAMS in the future. If you have any questions about our comments, please feel free to contact either one of us or Christy M.P. Gilmour, AAOS Manager, Medical Research, Office of Government Relations, at 847-384-4323 or gilmour@aaos.org.

With Kind Regards,



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