The Current Practice of Orthopaedic Oncology in North America

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Abstract

Background The field of orthopaedic oncology in North America has been formalized over the past 30 years with the development of the Musculoskeletal Tumor Society (MSTS) and fellowship education opportunities.

Questions/purposes To characterize current practices we assessed the fellowship education, practice setting, constitution of clinical practice, bone and soft tissue sarcoma treatment volume, perceived challenges and rewards of the career, and the nonclinical activities of orthopaedic oncologists.

Methods Members of the MSTS and attendees of the 2009 AAOS–MSTS Specialty Day meeting were invited to participate in a twenty-three question online survey. One

hundred and four surgeons including 99 of the 192 (52%) MSTS members completed the online survey.

Results Sixty-nine of the 104 (66%) responding surgeons completed a 1-year musculoskeletal oncology fellowship. Thirty-eight (37%) completed an additional orthopaedic subspecialty fellowship. Seventy-four (79%) work in an academic practice and 70 (+/– 16) % of clinical time is spent practicing musculoskeletal oncology. An average of 20 (+/– 16) bone and 40 (+/– 36) soft tissue sarcomas were treated annually. Insufficient institutional support, reimbursement, and emotional stresses were perceived as the most important challenges in a musculoskeletal oncology practice. Sixty-seven (64%) of the surgeons reported serving in a leadership position at the departmental or national level.

Conclusions Professional time distribution is similar to other academic orthopaedists. The members of the MSTS are responsible for the treatment of more than two-thirds of bone and soft tissue sarcomas in the United States.

Clinical Relevance This information can assist the fellowship directors and related professional societies in tailoring their educational programs and the interested orthopaedic resident to make a more informed career choice.

Each author certifies that he or she has no commercial associations (eg, consultancies, stock ownership, equity interest, patent/licensing arrangements, etc) that might pose a conflict of interest in connection with the submitted article.

Each author certifies that his or her institution approved the human protocol for this investigation and that all investigations were conducted in conformity with ethical principles of research. This work was performed at the University of Florida Department of Orthopaedics and Rehabilitation.

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Introduction

Orthopaedic oncology is a subspecialty of orthopaedic surgery that encompasses the treatment of bone and soft tissue neoplasms, developmental dysplasias, and tumor-like conditions. The skill set of the orthopaedic oncologist has developed from the reconstruction of skeletal and soft tissue defects that result from the treatment of these tumors. Using this skill set, the scope of the orthopaedic

oncology practice extends further to the treatment of multiple myeloma, metastatic disease, and trauma and adult reconstruction cases that require reconstruction of major skeletal defects.

Fifty years ago, most sarcomas in North America were treated by general surgeons and many surgeries were ablative in nature [9, 21]. Advances in chemotherapy, radiation oncology, imaging, and surgical margin concepts have improved the survival of patients with primary bone and soft tissue sarcomas [6, 8, 13, 14, 17, 24, 25]. Additionally, these advances, coupled with improvements in prosthetics and reconstructive techniques, have made limb salvage possible in the majority of cases [10, 12, 18–20, 26]. The need for skeletal reconstruction that accompanied these advances has brought the skill set of the orthopaedic surgeon to the forefront of this field. In 1977, a small nucleus of clinicians founded the professional society for orthopaedic oncology in North America, the Musculoskeletal Tumor Society (MSTS) [9, 21]. At the time of its founding, the Society consisted of 11 members: 10 orthopaedic surgeons and one pathologist.

Coinciding with the formation of the Society was the emergence of orthopaedic oncology fellowships [9]. The goal of these fellowships is to provide multidisciplinary education in the diagnosis and treatment of musculoskeletal tumors and diseases. Some of these early fellowships developed from existing nationally designated centers of education for musculoskeletal pathology. There were no more than three fellowships available at the time of the founding of the MSTS [9]. Today there are approximately 14 orthopaedic oncology fellowships and an estimated 380 orthopaedic surgeons who report oncology as a specialty area [2, 3, 7]. With the evolution of the field over the past 30 years, the care of bone and many extremity, pelvic and shoulder girdle soft tissue tumors has been assumed by the orthopaedic oncologist [9, 21]. Although not documented, we presume many spinal tumors are cared for by orthopaedic surgeons and neurosurgeons specializing in spinal problems.

We presume an improved understanding of the education and clinical practice of this group could be utilized by fellowship directors and related societies to appropriately tailor their educational and programmatic efforts. An understanding of average sarcoma treatment volume is important for future discussions of workforce issues and quality care improvement. Further, an understanding of the activities of members of this group would likely be of interest to the orthopaedic resident considering a career in orthopaedic oncology.

The purpose of this study was therefore to assess the (1) educational background; (2) practice setting; (3) average sarcoma treatment volume; (4) perceived career challenges and rewards; and (5) nonclinical endeavors of orthopaedic oncologists in North America.

Materials and Methods

A twenty-three question survey was constructed by two of the authors (JW, MS) to address the study goals (Appendix 1). Some of the questions were constructed to correlate with those seen on the American Academy of Orthopaedic Surgeons Orthopaedic Practice Survey [3] to allow comparison of our data. The remaining questions were designed based on our assessment that the information would be of use to orthopaedic oncology current practitioners, orthopaedic residents and fellowship educators. The survey was then completed and critiqued by the remaining authors, the president of the MSTS, and four current orthopaedic oncology fellows. The survey results and critiques were then utilized to modify the survey as indicated. Invitations were sent to 192 members of the MSTS by electronic mail. Additionally, an open invitation was extended to the attendees of the 2009 AAOS-MSTS specialty day meeting by poster and announcement.

The survey was hosted by the SurveyMonkey web service, which facilitated distribution of the e-mail invitations, administration of the survey instrument, and collection of the results. One hundred and four surgeons completed the online survey from November 18th, 2008 to June 22nd, 2009 including 99 of the 192 (52%) members of the MSTS. Once the study period was closed, the results were collected in an anonymous manner for analysis. The survey instrument required an answer for 21 of the 23 questions so there were no missing data for these questions. Question #10 and question #12 (Appendix 1) instructed the participant to leave the question blank if the answer was unknown. There were 4 respondents who left #10 unanswered and 19 who left #12 unanswered, resulting in a sample size of 100 and 85 for those questions respectively. Question #16, which assessed the average annual sarcoma treatment volume, had an option "> 90". This value was recoded as 100 for 12 answers regarding soft tissue sarcoma volume and one answer regarding bone sarcoma volume to allow the calculation of a mean and comparison between groups. Independent t-tests or one-way analysis of variance tests were used to determine if the mean treatment volume of bone sarcomas and soft tissue sarcomas differed between the groups of interest. Chi-square or Fisher's exact tests were performed to determine if an association existed between categorical variables of interest. Means are reported as the value (+/- standard deviation). Approval for the study was obtained from the Institutional Review Board of the University of Florida.

Results

An orthopaedic oncology fellowship was completed by 93% of the respondents at 22 different institutions.

Sixty-nine percent of the surgeons completed a 1-year fellowship and 83% of these had no protected research time. Seventeen percent completed a 2-year fellowship and 65% of these had a full year of protected time for research. There was no difference in the practice setting ($p = 0.11$), bone sarcoma volume ($p = 0.11$), soft tissue sarcoma volume ($p = 0.41$), or leadership involvement ($p = 0.65$) between respondents who completed a 6 to 18 month fellowship versus those who completed a 2 to 3 year fellowship. An additional subspecialty fellowship was completed by 35% of respondents with pediatric orthopaedics, spine surgery, and adult reconstruction most strongly represented (Table 1).

Table 1. Results of the survey: education

Parameter	Percent
Current orthopedic oncology practice statement	
Completed an orthopedic oncology fellowship and it remains a major part of practice	85
Completed an orthopedic oncology fellowship but it does not remain a major part of practice	8
Did not complete an orthopedic oncology fellowship but it is a major part of practice	7
Time since completing orthopedic oncology fellowship	
0–10 years	35
11–20 years	37
21–30 years	20
> 30 years	2
Not applicable	7
Length of orthopedic oncology fellowship	
6 months	2
12 months	69
15–18 months	4
24 months	17
36 months	1
Protected research time during orthopedic oncology fellowship	
0 months	72
1–6 months	14
9–12 months	13
24 months	1
Additional orthopedic subspecialty fellowship	
Pediatric orthopaedics	8
Spine	6
Adult reconstruction	5
Research	5
Sports	2
Hand surgery	2
Foot and ankle	0
Shoulder and elbow	0
Other (included Ilizarov, trauma, biochemistry, pathology)	10
None	65

Eighty percent worked in an academic or combined academic-private setting and 15% worked in private practice (Table 2). There was no difference in bone sarcoma volume ($p = 0.11$), soft tissue sarcoma volume (t -test $p = 0.24$) or leadership involvement ($p = 0.67$) between surgeons who work in an academic or academic-private setting versus those who work in a private or “other” setting. Fifty-one surgeons reported that they were the only orthopaedic oncologist in their group. When compared to

Table 2. Results of the survey: practice

Parameter	Value
Practice Setting (%)	
Academic	71
Private	15
Combined	8
Other (includes VA, Shriners, Military, HMO, hospital based)	6
Average practice group size (number +/– standard deviation)	17 +/– 17
Average number of orthopedic oncologists in (number +/– standard deviation)	
Practice group	2 +/– 1
Immediate geographic (metropolitan) area	3 +/– 3
State	6 +/– 4
Population of metropolitan area at practice location (% reporting)	
< 250,000	9
250,000–1 million	27
1–3 million	34
> 3 million	30
Distribution of professional time (% +/– standard deviation)	
Clinical practice	67 +/– 18
Medical education	10 +/– 9
Administration	9 +/– 12
Clinical research	7 +/– 6
Basic science research	5 +/– 11
Retired or semi-retired	1 +/– 10
Medical industry endeavors	1 +/– 2
Other (professional society activities)	1 +/– 10
Other positions or responsibilities (% reporting)	
Head of group	19
Residency program chair	15
Research supervisor	13
Academic department chair	10
Chief of staff	6
AAOS leadership position	5
Dean	1
Other society leadership position (ie, MSTs, CTOS, ISOLS, ORS)	18
Other (included sarcoma director or assoc. director, vice chair, divisional chair)	24
None of the above	36

Fig. 1 The percentage of time that an orthopaedic oncologist spent practicing within the specialty is shown. The majority (82%) of orthopaedic oncologists spent > 50% of their clinical time and 23% spend 100% of their clinical time practicing within the field.

solo orthopaedic oncologists, surgeons who practice with one or more other oncologists are more likely to work in academic or academic – private setting (93% versus 65%, $p = 0.0005$) and care for more bone sarcomas (25 (+/- 20) versus 14 (+/- 9), $p = 0.002$) and soft tissue sarcomas (45 (+/- 30) versus 29 (+/- 26), $p = .004$). There was no difference in the level of leadership involvement (69% versus 58%, $p = 0.26$) between the two groups.

Respondents reported 67 (+/- 18)% of their time was spent in clinical practice with 71 (+/- 28)% of this time dedicated to orthopaedic oncology (Fig. 1). Adult reconstruction, trauma, pediatric surgery, and spine represent the most popular additional subspecialties practiced (Fig. 2).

The respondents treated an average of 20 (+/- 16) bone and 38 (+/- 31) soft tissue sarcomas annually. Eighty-three percent of surgeons treated between 10 and 30 bone sarcomas each year, 7% treated 50 or more, and 6% treated none (Fig. 3). There was more variability in the treatment of soft tissue sarcomas with 69% of surgeons treating between 10 and 50 per year, 22% treating 60 or more per year, and 6% treating none (Fig. 4). Orthopaedic surgery was responsible for the treatment of 80% of soft tissue sarcomas in the surgeons' institutions.

Insufficient institutional support, poor reimbursement, and emotional stresses were seen as the most important challenges in a musculoskeletal oncology practice (Table 3). The most important factors for providing career satisfaction were complex and challenging surgical cases, challenge of diagnosis, and case variety (Table 3). The perceived highest quality of multidisciplinary support was from radiation oncology (Table 4).

Fig. 2 The distribution of the clinical practice of the orthopaedic oncologist is shown. An average of 71 (+/- 27)% of time was spent practicing orthopaedic oncology while adult reconstruction, pediatric orthopaedics, spine surgery and trauma represented the most popular additional subspecialties practiced.

Fig. 3 The annual bone sarcoma treatment volume of the orthopaedic oncologist is shown. The average treatment volume was 20 (+/- 16) with 83% of orthopaedic oncologists treating between 10 and 30 bone sarcomas annually.

Fig. 4 The annual soft tissue sarcoma treatment volume of the orthopaedic oncologist is shown. The average annual soft tissue sarcoma treatment volume was 38 (+/- 36) with 69% treating between 10 and 50 annually.

Table 3. Results of the survey: career challenges and rewards

Importance of factors in providing significant career challenges		
Factor	Percent reporting as “not important” or “somewhat important”	Percent reporting as “important” or “very important”
Reimbursement	44	56
Emotional stress	57	43
Insufficient institutional support	58	42
Insufficient case volume	72	28
Time commitment for research	72	28
Time commitment for administrative efforts	81	19
Change of interest	88	12
Importance of factors in providing significant career satisfaction		
Factor	Percent reporting as “not important” or “somewhat important”	Percent reporting as “important” or “very important”
Case variety	3	97
Complex and challenging surgery	4	96
Challenge of diagnosis	9	91
Multidisciplinary care aspect	16	84
Further academic career	36	64
Research interest	46	54
Reimbursement	66	34

The time spent in nonclinical endeavors was divided as outlined with administration, medical education, clinical research and basic science research most prevalent (Table 2). Sixty-four percent of surgeons have served in leadership positions at the local or national level (Table 2).

Discussion

Over the past 30 years, the field of orthopaedic oncology in North America has been formalized with the establishment of the MSTS and the fellowship education of physicians [9, 21]. The goal of this study is to gain a better understanding of the fellowship education, setting and scope of clinical practice, sarcoma treatment volume, perceived challenges and rewards of the field, and nonclinical activities of an active orthopaedic oncologist in North America.

We acknowledge a number of limitations to this survey. First, the study group is comprised of the members of the MSTS and nonmember attendees of the 2008 AAOS—

Table 4. Results of the survey: perception of multidisciplinary support

Factor	Percent reporting as “poor” or “fair”	Percent reporting as “good” or “excellent”
Radiation Oncology	8	92
Pathology	12	88
Adult Oncology	20	80
Pediatric Oncology	24	76
Musculoskeletal Radiology	27	73
General Surgery	28	72
Plastic Surgery	32	68
Case Manager	56	44

MSTS Specialty Day who voluntarily responded to the invitation. This introduces a selection bias that may prejudice the study group to include the more active and engaged members of the community. Thus, the report may overestimate the amount of time spent practicing orthopaedic oncology, sarcoma treatment volume, academic appointment, and level of participation in leadership activities. Orthopaedic oncologists who are not members of the MSTS and did not attend the Specialty Day meeting were not included in the potential study group. The 2008 AAOS orthopaedic practice survey estimates that 381 of its members would report that oncology is a practice focus [3]. Therefore we estimate that approximately 190 orthopaedists who are not members of the MSTS report that oncology is at least part of their practice focus. It is not possible to further characterize this group with the available information and it is unknown what percentage should be considered as an “orthopaedic oncologist” for the purposes of this discussion. For example, orthopaedic spine surgeons who provide tumor care may be included in this group. We received only four responses from this group and therefore do not intend to extrapolate the results of this study to that population. Second, there is a recall bias inherent with utilization of a survey instrument. Question # 16, which assessed the average annual treatment volume of bone and soft tissue sarcomas, was constructed with the highest value being “> 90”. In order to allow a comparison of the mean treatment volumes, this entry was recoded as “100” for 12 responses for soft tissue sarcomas and one response for bone sarcomas. This coding would result in a conservative estimate of the mean treatment volume. Despite these limitations, we presume the study group represents members of the MSTS due to the 52% member response rate and the distribution of practice setting, practice size, practice area population, and fellowship institutions. In addition, we assert that a direct query of the practitioners is the best currently available method to gather the data needed to address our study goals.

The results of this study shed light on the educational background of orthopaedic oncologists. The 14 orthopaedic oncology fellowships currently available offer a 1-year clinical fellowship and eight of these publicly either offer or require a second research year [2]. Despite the availability of these opportunities, the majority of orthopaedic oncologists (69%) in this study have chosen to complete a 1-year fellowship with no substantial change in this distribution over time. There were no differences seen in the clinical practices or involvement in leadership activities between the respondents who completed a 1-year fellowship versus those who completed a 2-year fellowship. One-third of the respondents have completed a fellowship in another orthopaedic subspecialty. This distribution mirrors that of the general orthopaedic specialist as 32% of fellowship-trained U.S. orthopaedists have completed a fellowship in more than one area [3].

The majority (80%) of orthopaedic oncologists practice within an academic or combined private-academic setting. This is higher than that of the average full-time U.S. orthopaedist (11.5%) [3] or that of the members of the Pediatric Orthopaedic Society of North America (49%) [5], the only other orthopaedic subspecialty for which we are aware of available data. Effective sarcoma care requires the coordination of a multidisciplinary team [4, 9, 23]. The concentration of the specialists required to form this multidisciplinary team in academic medical centers is likely one of the major reasons for this observation.

The sarcoma treatment volume data from the study group comprise a large portion of the annual sarcoma cases in the United States. Sarcomas are rare tumors with an average of 2,700 bone sarcomas and 5,700 soft tissue sarcomas (excluding head, neck and abdominal sites) diagnosed each year in the United States [1, 15, 22]. The study group as an aggregate reported an average annual treatment volume of 2,130 bone and 3,940 soft tissue sarcomas. An extrapolation of the average volume seen in this study to the 192 members of the MSTS would estimate that this group treats 3,950 bone and 7,250 soft tissue sarcomas annually. This overestimation is likely due to the selection of the more active members of the society. However, from this data a conservative estimate can be made that the members of the MSTS care for at least two-thirds of bone and soft tissue sarcomas in the United States. This makes it apparent that the members of the MSTS must be the leaders in advancing sarcoma care through research and quality improvement efforts.

The sarcoma volume data of this study also raises some potential quality care issues. The development of tertiary care sarcoma centers and multidisciplinary care teams has been instrumental in improving sarcoma care and driving advancements in the field [4, 9, 19]. The National Institute for Health and Clinical Excellence (NICE) in the United Kingdom has attempted to address this issue by

recommending that a multidisciplinary sarcoma care team should manage at least 50 bone and 100 soft tissue sarcoma cases each year [23]. The respondents in this study report an average annual treatment volume of 20 bone and 38 soft tissue sarcomas with this number being much lower for surgeons who were the only orthopaedic oncologist in their group. The results from this study cannot be directly evaluated against the NICE recommendations as individual surgeon volume was assessed and no data were gathered on the total volume of a care group. In addition, orthopaedists in North America arguably face a different set of societal and geographic pressures that must be taken into account when applying these recommendations. However, we believe this identifies an area for future investigation and potential for sarcoma quality care improvement efforts. As the caregivers for the majority of sarcomas in the U.S., the MSTS and its members have an opportunity to shape these efforts in improving sarcoma care.

Conclusions about orthopaedic oncology workforce issues are beyond the scope of this report. However, there are insights that can be gleaned from this data that may be of use for future endeavors in this area. The 1998 RAND orthopaedic workforce study estimated that 415 full time equivalents would be needed in 2010 for the operative and nonoperative care of “mass or tumor” [16]. This value is similar to the estimated 381 AAOS members that would report “oncology” as a specialty area [3]. The respondents do not appear to be reflecting overwhelming workforce concerns as 83% of the respondents spend at least 50% of their clinical time within the field of orthopaedic oncology and only 28% considered insufficient case volume an “important” or “very important” career challenge. To establish an educated discussion on this topic we need to gain a better understanding of the number and practices of orthopaedic oncologists who are not members of the MSTS, accurately track the production of orthopaedic oncology fellows, determine the retention rate of fellows within the field, and improve the epidemiology of bone and soft tissue sarcomas. As neither the American Board of Orthopaedic Surgery nor the Accreditation Council for Graduate Medical Education is involved in determining or controlling the number of orthopaedic surgeons in the U.S. in response to workforce concerns [11], the MSTS and fellowship educators will need to take the principal role in any orthopaedic oncology workforce endeavors.

The perceived career challenges and rewards can be important to the orthopaedic resident who is considering an orthopaedic oncology fellowship. The major challenges in the field were reported as insufficient institutional support, poor reimbursement, and emotional stresses. The most important factors for providing career satisfaction were complex and challenging surgical cases, challenge of diagnosis, and case variety.

The distribution of professional time of the orthopaedic oncologist mirrors that of the average U.S. orthopaedist who works in an academic setting [9]. This includes similar time spent in clinical practice (67% versus 68%), teaching (10% versus 10%), administration (9% versus 10%), and research (12% versus 8%) [3]. Sixty-five percent of the respondents are involved in leadership positions at the local or national level. The prospective orthopaedic oncologist can anticipate having available leadership opportunities, and the overall structure of their career will be similar to that of other academic orthopaedists with whom they have trained.

The insights of this study on the current state of orthopaedic oncology emphasize the central role of the MSTs and its members in sarcoma care and draw attention to some of the current issues facing the field. The society's leadership will need to coordinate the community's efforts in addressing future research goals, workforce issues, and sarcoma care quality improvement endeavors.

Acknowledgments We thank the members of the orthopaedic oncology community who participated in this survey.

Appendix: Survey

1. Default Section

To: Musculoskeletal oncologists
From: Mark Scarborough and Jeremy White

Survey Purpose: The purpose of this survey is to collect information on the educational background and practices of surgeons who completed a musculoskeletal oncology fellowship or who practice as musculoskeletal oncologists. Specifically we are interested in evaluating the proportion of professional time spent in clinical practice, research, administration and other endeavors. Additionally we are interested in knowing the scope of clinical practice including the number of surgical cases, number of sarcomas treated and the type of practice. A similar survey will be administered to current and prospective musculoskeletal oncology fellows to assess their expectations. We plan to present the data to the membership of the Musculoskeletal Tumor Society and pursue publication if appropriate. The survey has University of Florida IRB approval. Confidentiality of answers will be maintained. The survey can be completed online in about 10 minutes. Thank you for your participation.

IF YOU HAVE TECHNICAL ISSUES WITH THE SURVEY OR QUESTIONS PLEASE CONTACT ME AT jwhite@orthotumor.net.

* 1. What statement best describes you?

- ☐ I completed a musculoskeletal oncology fellowship and it remains a major part of my clinical practice
- ☐ I completed a musculoskeletal oncology fellowship and it is not a major part of my clinical practice
- ☐ Musculoskeletal oncology is a major part of my clinical practice and I did not participate in a musculoskeletal oncology fellowship

Other (please specify)

* 2. Where did you complete your Musculoskeletal oncology fellowship?

- ☐ Case Western University
- ☐ Emory University
- ☐ University of California Los Angeles (UCLA)
- ☐ University of Chicago
- ☐ University of Florida
- ☐ University of Miami
- ☐ University of Texas MD Anderson Cancer Center
- ☐ University of Toronto, Mt. Sinai Medical Center
- ☐ University of Utah, Huntsman Cancer Institute
- ☐ UMDNJ, New Jersey Medical School
- ☐ Vanderbilt University
- ☐ University of Washington, Seattle
- ☐ Massachusetts General Hospital
- ☐ Memorial Sloan-Kettering Cancer Center
- ☐ Mayo Clinic
- ☐ Washington Cancer Institute, Washington, DC
- ☐ Did not complete an Orthopedic Oncology fellowship
- ☐ Other

Other (please specify)

* 3. How long ago did you complete your musculoskeletal oncology fellowship?

☐ 0-5 years ago	☐ 15-20 years ago	☐ >30 years ago
☐ 5-10 years ago	☐ 20-25 years ago	☐ Not applicable
☐ 10-15 years ago	☐ 25-30 years ago	
☐ Other (please specify)		

* 4. What was the length of your Musculoskeletal Oncology Fellowship?

- ☐ 1 year
- ☐ 2 years
- ☐ 3 years
- ☐ NA
- ☐ Other (please specify)

5. If applicable, how much dedicated RESEARCH TIME (free of clinical duties) did you have during your musculoskeletal oncology fellowship?

Please enter time in
MONTHS, leave blank
if not applicable:

* 6. If you did other fellowships, what fellowship(s) did you complete? (please mark all that apply)

- ☐ Adult Reconstruction
- ☐ Foot & Ankle
- ☐ Hand
- ☐ Pediatric Orthopedics
- ☐ Research
- ☐ Shoulder & Elbow
- ☐ Spine
- ☐ Sports
- ☐ Not applicable
- ☐ Other (please specify)

* 7. What is the setting of your current practice?

- ☐ Academic Practice
- ☐ Private Practice
- ☐ Combined
- ☐ Other (please specify)

* 8. Including yourself, how many orthopedic surgeons are in your practice group?

-

* 9. Including yourself, how many musculoskeletal oncologists are in your practice group?

-

10. Including yourself, how many musculoskeletal oncologists practice in your immediate geographic area (i.e. metropolitan area)? Leave blank if unknown.

-

* 11. What is the population of the metropolitan area in which you practice?

- ☐ <250K
- ☐ 250K - 500K
- ☐ 500K - 1 Million
- ☐ 1 - 3 Million
- ☐ >3 Million

12. Including yourself, how many musculoskeletal oncologists practice in your state? Leave blank if unknown.

-

* 13. What percentage of your PROFESSIONAL TIME is spent in each category? Total should equal 100%.

	0	10	20	30	40	50	60	70	80	90	100
Clinical Practice	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Clinical research	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Basic science research	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Administration	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Medical Education	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Medical Industry Endeavors	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Retired or semi-retired	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Other (please specify)	____										

* 14. What percentage of your CLINICAL TIME is spent practicing the following subspecialties? Total should equal 100%.

	0	10	20	30	40	50	60	70	80	90	100
Musculoskeletal Oncology	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Adult Reconstruction	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Foot & Ankle	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Hand	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Pediatric Orthopedics	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Shoulder & Elbow	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Spine	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Sports	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Trauma	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Other (please specify)

* 15. Please describe your other positions or responsibilities.

- ☐ Academic department chair
- ☐ Residency program director
- ☐ Head of group
- ☐ Dean
- ☐ Chief of staff
- ☐ Research supervisor
- ☐ AAOS leadership position
- ☐ Other society leadership position (i.e. MSTS, CTOS, ISOLS, ORS, etc.)
- ☐ None of the Above
- ☐ Other (please specify)

* 16. About how many new sarcomas of bone and soft tissue do you treat each year?

	0	10	20	30	40	50	60	70	80	90	>90
Bone sarcomas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
Soft tissue sarcomas	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

Other or comments

* 17. In your institution what percent of soft tissue sarcomas are treated by orthopaedic surgery vs. other surgical subspecialties? Total should equal 100%.

	0	10	20	30	40	50	60	70	80	90	100
% treated by orthopaedic surgery	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
% treated by other surgical subspecialties	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐

18. If you have stopped practicing musculoskeletal oncology, how many years after fellowship did you practice before doing so? Leave blank if not applicable.

-

* 19. How would you rate the importance of the following factors as providing significant challenges in your practice of musculoskeletal oncology?

	Not important	Somewhat important	Important	Very important
Insufficient case volume	☐	☐	☐	☐
Insufficient institutional support	☐	☐	☐	☐
Reimbursement	☐	☐	☐	☐
Emotional stress	☐	☐	☐	☐
Change of interest	☐	☐	☐	☐
Time commitment for research interests	☐	☐	☐	☐
Time commitment for administrative interests	☐	☐	☐	☐

Other factor (please rate importance):

* 20. How would you rate the importance of the following factors in providing satisfaction in your career as a musculoskeletal oncologist?

Case Variety	☐	☐	☐	☐
Challenge of diagnosis	☐	☐	☐	☐
Complex and challenging surgical cases	☐	☐	☐	☐
Further academic career	☐	☐	☐	☐
Multidisciplinary interaction and patient care	☐	☐	☐	☐
Reimbursement	☐	☐	☐	☐
Research interest	☐	☐	☐	☐

Other (please specify)

* 21. How would you describe the quality of the support in your practice setting from the following specialties?

	Poor	Average	Good	Excellent
Adult Oncology	☐	☐	☐	☐
Pediatric Oncology	☐	☐	☐	☐
Radiation Oncology	☐	☐	☐	☐
Musculoskeletal Radiology	☐	☐	☐	☐
General Surgery	☐	☐	☐	☐
Plastic Surgery	☐	☐	☐	☐
Pathology	☐	☐	☐	☐
Case Manager Support	☐	☐	☐	☐

* 22. Which of the following support staff do you have that spend significant time dedicated to your musculoskeletal oncology practice or research activities?

- ☐ Nurse Practitioner
- ☐ Physician Assistant
- ☐ Registered Nurse
- ☐ Medical Assistant
- ☐ PhD level research support
- ☐ Other level research support
- ☐ Social Worker
- ☐ Case Manager
- ☐ None of the Above

Other (please specify)

* 23. Are you a member of the following professional societies?

- ☐ American Academy of Orthopedic Surgeons (AAOS)
- ☐ Musculoskeletal Tumor Society
- ☐ Connective Tissue Oncology Society
- ☐ International Society of Limb Salvage
- ☐ None of the Above

Other (please specify)

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