

# Minimally invasive surgery: The evolution of fellowship

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**Background.** The field of postgraduate minimally invasive surgery/gastrointestinal surgery (MIS/GIS) training has undergone substantial growth and change. To determine whether fellowships are meeting a strategic need in training, we conducted a survey to assess the current status and trends of change in MIS/GIS fellowships.

**Methods.** A survey was distributed to fellows currently in MIS/GIS programs in the United States and Canada in 2003 and 2006. Fellows were asked to describe demographics as well as their experience both during fellowship and residency. We compared this with aggregate data of resident experience through the Accreditation Council for Graduate Medical Education (ACGME) case logs, data tracked by industry, and program data from the Fellowship Council (FC) web site.

**Results.** There were 54 responses to the 75 surveys distributed in 2006 (72% response rate). MIS fellows performed more laparoscopic cases during their residency than the average graduating chief resident, but did not feel competent to perform advanced laparoscopic surgery. However, combining fellowship numbers with residency numbers does suggest that the total experience provides competency in a wide variety of procedures.

**Conclusions.** It seems that the MIS/GIS Fellowship is meeting a real need among graduating surgical residents; fellows felt unprepared for clinical practice at the completion of residency. It is encouraging to note the improvements in fellowship structure, standards, and overall experience, brought by the efforts of the FC. It is hoped that this report of the state of MIS fellowship with a comprehensive review of current data will aid in further evaluation and improvement. (*Surgery* 2007;142:505-13.)

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THE TWENTIETH ANNIVERSARY of the introduction of laparoscopic cholecystectomy to North American surgeons is nigh upon us. Although this will stir a fading memory to many established surgeons, to others it will be observed simply as an historical footnote. Yet the impact of this procedure, and the revolution in surgical technique and patient care that it spawned, is probably unparalleled in surgical history.

In some regards, much has changed over the past 2 decades. Patients referred to abdominal surgeons of all clinical stripes now anticipate a “scarless” procedure, with a low complication risk, and from which they will return to their regular activi-

ties at a pace not dreamed of 20 short years ago. Minimally invasive surgery (MIS) has certainly made the transition from the experimental to the expected.

In another sense, little has changed. Debate continues to rage about the role of surgeons who perform MIS on the surgical landscape. Is there a place for surgical specialists who focus on techniques rather than on organ systems or disease states? Whether a patient has colon cancer removed laparoscopically by a general surgeon with MIS training or a colorectal surgeon with MIS training is still largely determined by the culture of practice within an institution and by the nature of regional and national training programs producing the surgeons. The ongoing vigor of the debate on the proper role and specialty assignment of MIS suggests that little has yet been resolved.

As patients increasingly demand minimally invasive options for their surgical problems, individual surgeons naturally want to be able to provide these services and techniques.<sup>1</sup> However, the majority of surgical oncologists, as well as gas-

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trointestinal, general, and colorectal surgeons, in practice today have not received formal training in advanced MIS techniques. The proliferation of all manner of MIS short courses, proctoring, "mini" fellowships, and full fellowships over the past 15 years bears testimony to the need surgeons have felt to be trained in these new procedures.<sup>2</sup>

The most appropriate forum for training in new and established surgical techniques should be a surgical residency program. Yet it is evident on a national level that surgical residency training in MIS remains woefully inadequate or at best inhomogeneous. A recent study surveyed 4th- and 5th-year surgical residents; 65% reported that they needed additional training beyond their residency to feel competent to practice advanced laparoscopic surgery.<sup>3</sup> Despite the prominence of MIS, not enough has changed in surgical training over the past 2 decades.

That the field of postgraduate MIS/gastrointestinal surgery (GIS) training has undergone substantial growth over the past several years is beyond debate. However, it is generally agreed that these changes occurred largely in response to unmet needs (for training) rather by deliberate, thoughtful design.<sup>2</sup> Fewer than 10 programs existed for advanced MIS/GIS training beyond residency in 1993. By 2006, >120 postgraduate fellowships in MIS/GIS were operational.<sup>4</sup> These fellowships have remained competitive: In 2006, only 79% of applicants matched into MIS/GIS fellowships.<sup>5</sup>

A significant and coordinated effort over the past 5 years has resulted in increased structure and coordination of MIS fellowships.<sup>2</sup> The Fellowship Council (FC), representing the vast majority of MIS/GIS training programs in North America, has established a matching process, standards, and an accreditation process for these fellowships.

While recognizing that efforts must continue to develop and standardize a national surgical residency curriculum that encompasses MIS/GIS, fellowships may be meeting a strategic need in surgical training. Our minimal understanding of the composition, operation, clinical experience, academic productivity, and ultimate quality of (surgeon) product of these fellowship programs is reflected in the paucity of literature on this subject. The focus of this study was to assess the current status and trends of change in MIS fellowships.

## METHODS

A survey was distributed to fellows currently in MIS/GIS programs in the United States and Canada. The survey was administered in person at a conference in August 2003 and 2006, and immedi-

ately collected. Fellows were asked to describe their experience both during fellowship and residency. The survey described the basic fellow and fellowship demographics, satisfaction with fellowship, reasons for choosing a fellowship, the numbers of cases performed as a resident, the number of cases felt to be needed for competency, future career plans, challenges of fellowship, and research experience. All data were self-reported.

The first version of the survey was distributed in 2003. The original survey was updated in 2006; most questions were adapted to Likert scales, and additional questions probing interactions with residents inserted. All questions in the 2006 survey were multiple choice except for the questions involving number of cases performed or expected to achieve competence.

Data were tabulated and analyzed in a Microsoft Excel database. *t*-Tests were utilized to compare the 2003 and 2006 data where possible. Some questions were changed or eliminated between 2003 and 2006 and therefore were not suitable for formal statistical analysis. Questions that provided a text response were examined and compared for qualitative trends.

To provide a basis for interpreting this survey data, we collated aggregate data of resident experience through the Accreditation Council for Graduate Medical Education (ACGME) case logs.<sup>6</sup> To supplement further the fellows' reports, we also obtained aggregate case experience data on 56 programs tracked and collected by industry (Tyco-US Surgical, North Haven, Conn). Additionally, program information was collated from the FC web site. The FC case experience is also self-reported, but is provided by the program director and not the fellow. This report then represents not merely a survey, but a comprehensive sampling of every major source of available data on MIS operative experience.

## RESULTS

There were 54 responses to the 75 surveys distributed in 2006 (72% response rate), and 31 responses to the 44 surveys distributed in 2003 (70% response rate). Questions that were incompletely or inadequately answered were excluded from analysis. Most fellows reported that their overall satisfaction was high, with 85% of respondents saying that fellowship met their expectations.

The majority of fellows were surgical residents in academic centers (72.5%), and similarly were enrolled at an academic center for fellowship (87%). In 2006, 37% rated their MIS training during residency as excellent to outstanding, whereas in 2003

**Table I.** Mean number of laparoscopic cases performed as a resident

Operation	ACGME 2004-2005	2003	2006	P (ACGME to 2006)	P (2003 to 2006)
Cholecystectomy	100.6 ± 40.5	115.0 ± 89.3	107.8 ± 48.3	.240	.075
Nissen	4.7 ± 5.1	8.3 ± 5.8	7.3 ± 6.6	.001	.435
Inguinal hernia	12.7 ± 11.9	20.4 ± 20.8	20.0 ± 22.8	.000	.953
Ventral hernia	—	12.9 ± 14.4	21.0 ± 18.3	—	.178
Colectomy	6.5 ± 7.1	5.9 ± 9.2	16.9 ± 19.3	.000	.000
Splenectomy	1.5 ± 1.6	3.6 ± 3.4	4.0 ± 7.6	.000	.372
Nephrectomy	—	1.2 ± 3.7	1.2 ± 3.2	—	.845
Adrenalectomy	—	1.8 ± 2.8	2.1 ± 2.8	—	.778
Thoracoscopy	—	13.9 ± 13.1	15.4 ± 13.7	—	.892

*t*-Test; *P*-values are shown.

**Table II.** Mean number of cases needed for competency

Operation	2003	2006	<i>P</i>	Industry data 2005 fellows
Cholecystectomy	33.2 ± 20.6	35.6 ± 20.9	.893	32.7 ± 52.7
Nissen	22.7 ± 9.2	22.0 ± 10.5	.676	16.8 ± 14.1
Inguinal hernia	20.6 ± 11.4	26.7 ± 15.8	.080	21.6 ± 27.7
Ventral hernia	12.4 ± 6.4	18.4 ± 9.7	.268	14.4 ± 14.0
Colectomy	23.4 ± 14.3	27.0 ± 14.4	.600	14.6 ± 18.2
Splenectomy	11.2 ± 6.9	13.6 ± 9.0	.361	2.7 ± 2.9
Nephrectomy	21.6 ± 11.2	18.0 ± 13.2	.963	1.7 ± 3.6
Adrenalectomy	12.1 ± 7.9	15.1 ± 10.0	.429	3.5 ± 4.6
Thoracoscopy	14.2 ± 7.5	15.1 ± 8.7	.463	1.0 ± 3.4

*t*-Test; *P*-values are shown. Also shown are industry data representing average case numbers of the 2005 fellows.

only 9.4% of fellows rated their resident training as excellent. Most fellows (65% in both 2003 and 2006) did not perform research during residency.

The self-reported cases performed by fellows as a resident did not differ significantly from 2003 to 2006, except for colectomy (Table I). On average, surgical residents who became MIS/GIS fellows had participated in nearly 17 laparoscopic colon resections in 2006, as opposed to approximately 6 cases in 2003. Laparoscopic cholecystectomy remained the most common laparoscopic procedure by far, with both our survey and ACGME data finding that residents performed in >100 cases during residency.

Comparison with ACGME numbers for 2004 and 2005 shows that MIS fellows performed more laparoscopic cases during their residency than the average graduating chief resident (Table I). In each major category, from splenectomy to inguinal hernia, the mean reported cases for fellows exceeded the mean numbers reported through the ACGME.

Fellows were also asked to estimate the number of cases of a given procedure that were necessary to achieve competence in that procedure, and the results are reported in Table II. Comparing the number of cases thought to be needed for competency (Table II) with the number cases performed

**Table III.** Answers to the question in 2006:

“What is the most important factor in selecting a fellowship?”

Answer	%
Types of procedures	60.0
Preceptor reputation	20.0
Clinical experience of previous fellows	15.6
Job opportunity at the center	2.2
Research opportunities	2.2
Flexible endoscopy	0

in residency (Table I), the data suggest that fellows in 2006 are completing residency feeling they are competent to perform only a handful of laparoscopic cases (cholecystectomy, ventral hernia, and thoracoscopy.) In all other procedures, from nephrectomy to Nissen fundoplication, the data identify that the fellows’ experience is not sufficient in quantity to meet their own definition of competence.

Fellows’ top reasons for selecting a fellowship in 2006 are shown in Table III. Principally, fellows selected training programs based on the mentor and the operative experience. No fellow reported the expectation that, after fellowship, his or her

**Table IV.** Answers to the question in 2006: “Which of the following strategies have been most effective in managing the relationships with the residents?”

<i>Answer</i>	<i>%</i>
Intraoperative teaching	31.8
Didactic teaching	18.2
Attending as mediator	18.2
“Sounding board” or resident resource	13.6
Changing pattern of rounds	6.8
Other	11.4

practice would be predominantly bariatric surgery. No fellow listed flexible endoscopy as the primary reason for pursuing fellowship.

Fellows were asked to estimate the percentage of bariatric surgery that they anticipated to be performing at the completion of fellowship. In 2003, the majority of fellows anticipated performing bariatric surgery: 45% of fellows anticipated at least one quarter of their practice would be bariatrics, and 20% expected more than half of their cases to be bariatrics. In 2006, 8% of fellows reported that they would not perform any bariatric surgery, and only 9% reported that between 50% and 75% of their cases would be bariatric. No fellow anticipated >75% of his or her practice would be bariatric surgery.

The relationship between fellows and residents was also explored. In 2003, 39% of respondents reported that the greatest challenge during fellowship was relations with residents. By 2006, the greatest challenge reported was maintaining adequate case volumes and case mix. The manner in which relations with residents have been best managed in 2006 are shown in [Table IV](#).

## DISCUSSION

Fellowship in MIS has undergone significant changes in recent years. Our survey of the majority of 2006 fellows provides a snapshot of the current conditions in fellowship, and the 2003 survey represents the conditions before the most recent major changes of the fellowship match, and the implementation of the 80-hour resident work week.

The American Surgical Association Blue Ribbon Committee issued its 2004 Report on Surgical Education, and described subspecialty fellowship in the following terms: “largely unregulated, unsupervised, nonuniform, and uncertified.”<sup>7</sup> In fact, a grassroots movement was already growing at that time, with a view to addressing the lack of regulation, supervision, and accreditation of MIS fellow-

ships. A group of fellowship directors came together to found the MISFC in 1997. The goal of the MISFC “was to develop guidelines for high quality fellowship training, to provide a forum for the directors of minimally invasive and gastrointestinal fellowships to exchange ideas, formulate training curricula; to establish uniform application and selection dates and to create an equitable computerized match system for applicants.”<sup>2</sup>

The MISFC was later incorporated in 2003 with 77 member programs. The first match occurred in December 2003, for 2004 fellowship selection. Not surprisingly, one of the greatest concerns of the 2003 fellows identified in our initial survey was the angst and vulnerability they felt while enduring the largely unregulated selection process. This issue was resolved by the time of the 2006 fellow survey and the contribution of the MISFC to that end must be recognized.

It also bears mentioning that the MISFC joined with representatives of the Society for Surgery of the Alimentary Tract, Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), American Hepato-Pancreato-Biliary Association, and American Society for Bariatric Surgery to form the FC in late 2004. Quality guidelines for fellowship programs were established and promulgated among the member programs. Further, one of the first actions of the newly formed FC was to create an independent accreditation committee charged with surveying all programs for the purposes of certifying compliance with the accepted guidelines. The first round of this gargantuan task has now been completed, addressing comprehensively the issues raised by the Blue Ribbon Committee.

From our survey, we can state that fellows in MIS had greater experience in advanced laparoscopic procedures during their residency compared with their peers, as reflected in their 2006 self-reported numbers and the ACGME 2004 and 2005 statistics. Despite this, current fellows do not feel equipped to perform these cases based on their residency experience alone. The fellows’ estimation of the number of cases needed for competency consistently exceeds the number reported during their residency experience. Comparison to the industry data from 2005 demonstrates that even 1 year dedicated to minimally invasive fellowship alone does not provide adequate experience to achieve competency. However, combining fellowship numbers with residency numbers does suggest that the total experience provides competency in a wide variety of procedures. Additionally, there is some indication of progress from 2003. In 2006, 37% of fellows rated their laparoscopic training in residency as

excellent or better, compared with 9.4% in 2003, suggesting that there is already some improvement in laparoscopic training in residency.

In the fellowship survey administered in 2006, approximately 3 in 4 fellows trained at an academic center for residency, with 87% participating in a fellowship at an academic institution. However, <38% intended to practice in an academic setting. In other words, these fellows did not feel adequately trained to engage in clinical practice outside of a tertiary care center at the completion of their formal residency training. It is not that fellows are generally pursuing mastery of the complexities of advanced laparoscopic techniques; rather, they represent the motivated residents who are, by their own account, ill-equipped to provide the services required by their future patients in the community.

With respect to bariatrics, there was an interesting and significant trend between 2003 and 2006. In 2003, when asked what percent of their future practices will involve weight loss surgery, nearly 20% reported that bariatric surgery would constitute more than half. By 2006, this number had fallen to just >9%. This may represent a waning interest among fellows in surgery for morbid obesity, or it may reflect market saturation in the demand for bariatric surgeons.

Despite the recent surge in interest concerning Natural Orifice Transgastric Endoluminal Surgery, flexible endoscopy was not seen as a primary focus among fellows. No fellow listed flexible endoscopy as the main reason that attracted them to fellowship. Flexible endoscopy holds great promise and importance for general surgery, and for MIS in particular. However, this message has not yet filtered to the level of the fellowship applicant.

Tension and problems between fellows and residents seems to have become less of an issue between 2003 and 2006. In 2003, 39% of fellows reported that their greatest challenge was the relationship with the residents. By 2006, only 14% of fellows described moderate or disruptive tension with the residents. Perhaps as programs matured, MIS/GIS fellows now have an accepted role that is better defined and delineated from that of the residents. The FC effort in setting standards and promoting accreditation certainly helped this process. The most commonly listed strategy for managing relations with residents is that of the fellow as teacher, both intraoperative as well as didactic. In other words, fellows ideally serve to augment resident education rather than displace residents from the operating theater. Although there is some tension inherent in the fellow–resident relationship, it is cooperation with direct interaction between fel-

low and resident that seems to provide the optimal arrangement.

One persistent concern is that the presence of a fellow may interfere with resident training and perpetuate the need for ongoing fellowships. Again, the available data are limited. A survey among residents was conducted at the end of the first year that a gynecologic laparoscopic fellowship was instituted.<sup>8</sup> The residents experienced no change in case volumes, and gave the fellow a positive approval rating, likely related to the fellow's involvement in resident education and training. In general surgery, the only available data suggest that programs with a fellowship have an increased number of advanced laparoscopic cases logged per chief resident.<sup>9</sup>

For training of residents, we believe that the benefits of maintaining strong fellowship programs will become even more apparent. Fellowships are better suited to evaluate and adopt new techniques and technologies in a more nimble way than is possible for residency programs. One might ultimately imagine a system in which fellowships serve, among other things, as the vanguard of surgical advancement and innovation. As techniques move from being “cutting edge” to “mainstream,” they would then transition in a coordinated way from fellowship to residency curricula. Because there is every indication that we will continue in this season of innovation in surgical technology and techniques for some time, fellowships may provide this unanticipated benefit.

There are few other published reports on graduate and postgraduate training in MIS/GIS. In 2002, a survey was sent to surgical residency programs involved in MIS training.<sup>10</sup> The survey found a surprisingly low operative exposure to MIS. The paper concluded that “American surgical residency programs do not meet the suggested MIS case range or volume required for competency.” In the present study, this is still the case.

Only one other survey of MIS fellowship has been published, dating from a survey administered in 2002.<sup>11</sup> This study was hampered by its poor response rate (32%). The authors found that fellowships were competitive, and provided a variable but adequate experience. They also found that 56% of fellows pursued a career in private practice after fellowship. It is difficult to compare the survey results directly, because there were different issues and concerns in the pre-FC era. Indeed, it was these developments that prompted us to change our survey between 2003 and 2006.

MIS/GIS fellowship remains a highly sought after position among graduating residents, as illus-

trated by the 79% match rate. The majority of residents (71% of residents graduating in 2004) report that they intend to pursue a fellowship.<sup>2</sup> Few objective data exist on the clinical impact of fellowship training. One study examined the first 75 bariatric cases performed by 2 surgeons, only one of which had received fellowship training.<sup>12</sup> The fellowship-trained surgeon had shorter operative times and fewer major complications, providing at least some objective demonstration of the clinical benefits of fellowship. The benefits of fellowship training have also been seen in colorectal surgery, where newly trained surgeons have been found to have outcomes comparable to their mentors.<sup>13</sup>

Naturally, there are limitations inherent in our descriptive survey methodology. Some bias may have been written into the survey itself. There may also be an element of selection bias in that the survey was not administered to all fellows, nor was there a 100% response rate. However, we believe that the cohort is representative of MIS/GIS fellows in North America.

Self-reported data must always be interpreted with some degree of caution, with the potential for misunderstanding the questions, memory confounds, or deception. This seems unlikely given the nature of this particular survey. We have buttressed our survey instrument with all independent, available data—from the ACGME, the FC, and that derived from industry.

In 2006, our survey permits us to draw a picture of the average MIS/GIS fellow in North America. The fellow is a 34-year-old man who completed training at an academic center but did not take time away from residency to do research. He seeks training at an academic center with a mentor who has a national reputation and an adequate case mix. Flexible endoscopy, like bariatric surgery, is not a priority. After fellowship, he plans on performing MIS/GIS in a community setting.

In reviewing the commentary from the fellows, several recurring themes were evident, and allow us to highlight some traits of successful fellowship programs. First, and not surprisingly, a good mentor is essential, both for drawing residents to the fellowship as well as for providing an adequate experience. Second, the goals of the fellowship must be clearly articulated at the beginning, and then met. It is also of utmost importance to maintain a balance between residents and fellows. This may be accomplished through strict delineation of roles and encouraging open communication, but genuine interest in resident training and education by the fellow was identified as the most important strategy for success.

## CONCLUSIONS

It seems that MIS/GIS Fellowship is meeting a real need among graduating surgical residents. This study revealed that most MIS/GIS fellows plan to practice surgery in a nonacademic environment regardless of whether they trained in a community or academic program. Furthermore, these fellows completed residency with a higher number of laparoscopic cases on average than the national experience, yet still felt unprepared for clinical practice. Combining their fellowship operative experience with residency cases appeared to provide the fellows a volume and breadth of experience that was adequate, in their view, to achieve competence.

Thus, 20 years after the introduction of laparoscopic cholecystectomy, MIS/GIS fellowship continues to play an important role in the training of surgeons in North America. It is encouraging to note the improvements in fellowship structure, standards, and overall experience over the past several years brought about in large part by the efforts of the FC.

Work is afoot to develop a national curriculum for MIS/GIS fellowship training, which would further standardize the training experience. It is likely that some form of national curriculum for surgical residency training will also soon evolve. In the meantime, efforts must continue in parallel to ensure adequate clinical exposure, standards, and coordinated curricular development for MIS/GIS training at the residency and fellowship level. It is hoped that this report of the state of MIS fellowship with its comprehensive review of current data will aid in this process.

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## DISCUSSION

**Dr Nathaniel Soper** (Chicago, Illinois): You did a survey of fellows in minimally invasive programs and you give us a snapshot of their current concerns and experience. You have shown that there have been increasing numbers in residency in selected cases during this 3-year window between 2003 and 2006. And for those of us who are fellowship directors, I think you have given us good information regarding what we ought to include as priorities in our program.

We are now in the 20th year since the introduction of laparoscopic cholecystectomy in France. In about 1993, the SAGES organization approached the American Board of Surgery and asked whether we could weigh in on the development of the fellowships that were just springing into being. We were told that we could not because there was a fear that we would create a franchise, so this was put to rest. The FC then sprung up primarily to look at minimally invasive fellowships, but later then developed into an all-encompassing, noncolorectal GI fellowship mechanism. It has brought order to chaos; specialty fellowships were largely unregulated, unsupervised, nonuniform, and uncertified. The FC is going out to accredit these fellowships and a curriculum is currently being developed.

How was your survey administered? Was it mailed out? Was this at a meeting? In what time of year was it given?

You said that 87% of those surveyed were in academic programs. Overall, of these GI fellowships, what percentage are in academic centers versus in private practice settings?

The fellow–resident interaction continues to be a concern for all of us. Were the fellows asked with what level of residents they interacted primarily in their programs? I think that makes a big difference.

It looks as though the residency and fellowship numbers combined are adequate to meet what these fellows believe are enough for competence. As I recall, there have been some articles written by experts saying what they think are the minimum numbers for competence. How do the numbers match between the fellows' and the experts' thoughts?

Finally, I thought it was very interesting to see that these fellows had more laparoscopic experience during their residency than the average graduating residents.

**Dr S.M. Kavic** (Baltimore, Maryland): The survey was distributed at a conference of MIS and GI surgical fellows held in Arizona in August. So this was toward the beginning of fellowship, which is why we focused on analyzing residency numbers. I would suggest that the numbers from residency were fresh in the minds of the fellows at that time. Their numbers for fellowship would be less valid and were not asked. The survey was administered and collected on site.

The next question was concerning the bias toward academic centers. At this conference, no institution was represented by >1 fellow. Some academic centers may have 3 or even 4 fellows, but were represented by a single one. So although most at the conference were academics, there was a substantial community representation as well, the details of which are in our paper. In terms of the overall numbers of the breakdown between community and academic programs, I do not have those numbers at my fingertips.

With regard to the level of residents that fellows interact with, the Residency Review Committee rules would preclude having a chief resident or a 5th-year resident on the same service with the fellows. However, there are a number of means of dividing cases between a fellow and a chief resident. We did not specifically ask the fellows about their interactions with junior residents versus chief residents. However, the tension that is reported is almost exclusively that of operative competition—competition for the same cases—which simply does not exist between an intern and a fellow as it does between a 4th- or 5th-year resident.

In terms of what are expert levels of competence, the only data that I have seen come from a survey from the University of Kentucky, published in the *Journal of Gastrointestinal Surgery* in 2002, which criticized residency programs for being variable in their exposure to laparoscopic surgery and saying that overall the training did not meet the minimum needs. I think what the minimum needs are for competence are a matter largely of opinion.

**Dr Gerald M. Fried** (Montreal, Quebec, Canada): I think the 2 major accomplishments of the FC are the institution of the match and the accreditation process, both of which were put in place to protect the best interests of the applicant. I think the reduced stress that is reflected in your survey reflects the fairness of the process. Dr Park and his colleagues that instituted this council really deserve an enormous amount of credit.

The accreditation process is really directed at ensuring that there is a good match between what is posted or advertised for the fellowship and what the fellow actually gets. And when you look at the FC listing, you realize that there is a large variety in the composition of the fellowships. Although the numbers have increased enormously, the breadth of the fellowships has perhaps reduced as many fellowships have become very focused, for instance, in bariatrics.

So looking at the numbers of average number of cases is not a very good way of really looking at how well the fellowships meet the needs. For instance, if 50% of the fellowships were exclusively bariatrics, that is not going to be reflected in the average number of Nissens or inguinal hernias that a fellow will do. It really needs to match their needs or expectations.

My questions really relate to the drift of fellowship graduates into private practice as opposed to academic surgery. For me it is a bit of concern. If one of our goals is to try to increase the number of cases residents are exposed to, then I would hope that we would increase the number of people that graduate from these programs that then go on to teach residents so that their education can perpetuate the education of the next generation of residents.

**Dr S.M. Kavic** (Baltimore, Maryland): Personally, I found that to be one of the more alarming findings of our survey in that only 38% were declaring their interest in an academic center, whereas from my own experience I had thought that the vast majority sought fellowship to pursue teaching, training, and advanced laparoscopic practice in an academic center. I do not have a clear answer for the reason behind that.

Fellows are in general seeking the fellowship to achieve competence, which may mean that they just feel ill-equipped to go out and practice. If they wish to call themselves a bariatric surgeon, for instance, they need to pursue a fellowship first.

That is not an inappropriate role for a fellowship, but it would be hoped that there would be more trainers or educators coming out of the process than there apparently are.

**Dr L. Michael Brunt** (St. Louis, Missouri): Were you able to look at case numbers in fellowships that have a very heavy bariatrics focus versus those that have less bariatrics and are more broad based?

**Dr S.M. Kavic** (Baltimore, Maryland): Most of the programs that participated in the FC match process do not claim to do exclusively bariatrics. In searching through the web site at what the programs themselves report, only a handful—approximately 5 of the 127 programs—list themselves as being almost exclusively bariatrics. So within the overall numbers of the 127 programs, I think those numbers washed out to a good degree.

**Dr Mark A. Malangoni** (Cleveland, Ohio): Because the fellowships alone do not provide adequate experience as you have defined it, why not eliminate the fellowships and incorporate those cases into the general surgical residency and therefore produce a competent, adequately qualified individual when they finish their 5 years of general surgery residency rather than to have these fellowships go on?

Second, I would like your opinion about whether you think these fellowships would exist without industry sponsorship.

Finally, it is one thing to talk about perception of the trainees regarding their feelings about competence and number of cases. It is very different for us to develop some measures of whether or not this makes any difference in taking care of patients. The individual may feel more comfortable, and that is nice. The question is, does it make a difference? Do you have any outcome measures, or are there any plans that you have to develop outcome measures as to how this impacts patient care?

**Dr S.M. Kavic** (Baltimore, Maryland): The first question concerning shifting all cases down to the residents' level is certainly a good one. It is a point that is well taken. However, can we ensure that each experience among the residents is uniform? It is possible that there would be a nonuniform experience—not entirely a bad thing, but something we would have to consider at an administrative level.

With regard to industry sponsorship, it seems a necessary part of the process. It may be difficult to tease out whether or not that is inherently good or bad.

Last, in terms of your comment as to what the quality of the graduating fellow is, we do not have very good markers of standardization or of saying what a minimum level of competence is objectively. There are things such as the FLS and some SAGES initiatives that have come out and may help us to quantify competence, but at present we do not have good markers. There is only 1 study in the litera-

ture about fellowship training in bariatric surgery in Orange County in which 2 surgeons, 1 fellowship trained and 1 not fellowship trained, began advanced laparoscopic gastric bypass procedures. And not surprisingly, the fellow had mounted the learning curve a little sooner and had an overall decreased rate of complications. Beyond that, we do not know much.

**Dr Gerald M. Larson** (Louisville, Kentucky): The FC is interested in a balanced curriculum, minimum standards, and teaching opportunities for the fellows. So far, have any programs been put on probation or disapproved?

**Dr S.M. Kavic:** As I am not part of the FC, I cannot comment with 100% certainty on that. However, I can tell you that if you look at the FC web site you will see that not all programs have been accred-

ited. Some have withdrawn and some have apparently not been accredited.

**Dr Keith D. Lillemoe** (Indianapolis, Indiana): I have been on the Accreditation Committee of the FC for 2 years. Bruce Schirmer did a great job for the first year. We site visited about 85 programs. Of those, 17 did not receive full accreditation. None were shut down. They were given a 1-year probationary period to try to turn things around. And we will be site visiting those programs within the next 6 to 8 months. So there have been some actions by the accreditation committee and not just rubber-stamped approval.

**Dr Terence P. Wade** (Belleville, Illinois): If 75% of these fellowships are industry sponsored, can the Johnny Walker Liver Transplant Fellowship be far away?