With the ongoing climate changes in Canadian medical practice, there is some concern that this country will be unable to provide the potential lifestyles that its future physicians will demand. This study aims to take the first step in the process of gathering information on the attitudes and expectations of graduating Canadian medical students for the purposes of developing a basis against which to compare predictions for the future. Dalhousie University was used as the starting point for this study and numerous insights were gained into the factors that influence the decisions made by the students at that school. The next logical step is to apply the survey to graduating classes at all Canadian medical schools. It is hoped that the knowledge gained from this survey about the expectations of Canadian medical students can be compared both to current working conditions for practicing physicians and to predicted future practice patterns. Addressing discrepancies between expectations and realities will improve retention and career satisfaction among Canadian physicians.

INTRODUCTION

In Canada today, the climate of medical practice is continually changing. This is occurring for a number of reasons, but societal, technological, economic, political, environmental, ethical, and educational factors all have a role to play. Not least among these are the financial considerations that are so much in the minds of many of this country’s medical students. Debt loads are continually increasing, while the earning power of physicians in this country is dropping. These as well as many other external factors are combining to play a major role in the specialty choice of today’s medical students.

While the practice environment for new Canadian physicians is changing, so too are the needs of the soon-to-be doctors in our country. There is a greater and greater influence of lifestyle considerations for these people. New medical graduates often have lifestyle expectations that differ greatly from those of their predecessors.

With the ongoing changes in Canadian medical practice such as these, there is some concern that, in the near future, this country may not be able to provide an environment that new physicians will deem acceptable. Expectations about the quality of life for a new physician may cause more and more Canadian doctors to migrate to other parts of the world (e.g. the U.S.), where the conditions may be more favorable. In fact, in recent years there has been a relative increase in the movement of physicians to the United States and more Canadian students have been applying to American medical schools. Situations such as these have prompted the need for a serious look at the factors that may influence the future situation of Canadian medical practice.

One of the main purposes of this study was to begin the process of gathering data on current expectations and attitudes of Canadian medical students through the use of an email survey. The areas of interest included in the survey are: specialty choice, income, family / leisure time, control over schedule, responsibility, stress / pressure, job security, practice location, retirement age, debt load, and demographics. Once this process has been completed, it is intended that this information will be compared to predictions concerning the potential lifestyles that this country will be able to offer its new physicians. This is so that potential discrepancies between working conditions and expectations can be identified as soon as possible.
As with all major undertakings, these first steps are as much a learning experience as a foundation for further progress. The medical school at Dalhousie University was chosen as the first place to gather data and to refine the data collecting techniques. This paper describes the steps taken in the administration of the questionnaire used to survey graduating medical students at this school, the results attained from this effort, and a discussion of how to continue with the study in light of these results. It is expected that the lessons learned here will be applied to efforts to survey the remaining English-speaking Canadian medical schools. A reliable reflection of the current attitudes and expectations of English-speaking Canadian medical students will be useful in determining potential steps to be taken to improve the state of medical practice in Canada.

METHODS

The main tool used for this study was an email questionnaire. The steps followed for the creation and administration of this questionnaire were, as reasonably as possible, those of the Dillman Total Design Method. The main purpose for using this method was to attempt to maximize response rates, thus enabling a better representation of the attitudes and expectations of the general population of graduating Dalhousie medical students.

During the pilot study involving a small group of five potential respondents, it was found that the questionnaire took approximately six minutes to complete and, for the most part, the multiple choice options provided for each question were adequate. The questionnaire was also submitted to colleagues and potential users of the data for input on design and usefulness.

Minor changes were made to the questionnaire following the pilot study and then the final version of the questionnaire was emailed to all members of the fourth year class. The original mailing was followed by a series of reminders at one-week intervals. A similar method of follow-up has been shown to more than double response rates in most instances. This study showed a return rate of approximately 19% after the original mailout. After the first follow-up, the response rate rose to just under 50%. The final follow-up consisted of a personal visit to the fourth-year class with a hard copy of the questionnaire. This resulted in a final response rate of 60%.

Once the surveys were received, the responses were input to a spreadsheet. Before statistical analysis was begun, the data were verified for correctness and the original email surveys were deleted as promised by the consent form that preceded the questionnaire in each mailout to the potential respondents.

This research was approved by the research ethics board of Dalhousie University.

RESULTS

Statistical Tests

For each potential response in the questionnaire, a number of statistical tests were performed in order to analyze the data. For each question, the modal response and the percentage of respondents choosing the modal response was calculated. In addition, for the questions with graded responses, the median, mean, and standard deviation were calculated. Due to length constraints, this data has not been included here but is available from the author upon request.

Response Rates

Although there were eighty-three students in the fourth year class at Dalhousie University during this study, not all were included in the sample. Five of the students were from Malaysia, and were therefore ineligible to do their postgraduate training in Canada. As a result, it was felt that including these students in the survey was not appropriate as they would not have an effect on the future situation of medical practice in Canada. As well, one non-Malaysian student responded to the mailout expressing regret in his inability to complete the questionnaire before the due date. He too was dropped from the sample, bringing the total number of potential respondents down to seventy-seven. Of those seventy-seven, forty-six questionnaires were completed and returned in time for the writing of this report. The unreturned questionnaires were classified as refusals. The response rate was therefore calculated as follows:

\[
\text{Response Rate} = \frac{\# \text{ Returned}}{\# \text{ in sample} - \text{(noneligible + nonreachable)}} \times 100
\]

\[
= \frac{46}{83 - (5 + 1)} \times 100 = 60\%
\]

Demographics:

Of the forty-six respondents, twenty-four were males and twenty-two were females. Not all of the respondents completed every question in each questionnaire, so the denominator varied to a maximum of forty-six for calculations on individual questions. Of the respondents, 69% were between the ages of twenty-four and twenty-six, while an additional 24% were between the ages of twenty-seven and twenty-nine. All were expecting to graduate in 1999 and all were Canadian citizens. Eighteen percent were married while the remaining 82% were single at the time of the study. None of the respondents indicated that they had dependents, although 73% expected they would have at least one dependent while practicing medicine.

Career Choice:

The first question posed in the questionnaire sought the respondent's choice of career. Results showed that 54%
Table 1: Variables Relating to Career Choice

<table>
<thead>
<tr>
<th>Category</th>
<th>Selected Responses</th>
<th>Family Practice</th>
<th>Choice of Career Medicine</th>
<th>Surgery</th>
<th>Correlation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at Graduation</td>
<td>&gt;26</td>
<td>29%</td>
<td>57%</td>
<td>14%</td>
<td>-0.29</td>
</tr>
<tr>
<td></td>
<td>24-26</td>
<td>10%</td>
<td>52%</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>Debt at Graduation</td>
<td>none</td>
<td>0%</td>
<td>67%</td>
<td>33%</td>
<td>0.05</td>
</tr>
<tr>
<td></td>
<td>$1 - $10,000</td>
<td>50%</td>
<td>25%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$10,001 - $20,000</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$20,001 - $40,000</td>
<td>18%</td>
<td>64%</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$40,001 - $60,000</td>
<td>13%</td>
<td>63%</td>
<td>25%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$60,001 - $80,000</td>
<td>17%</td>
<td>50%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; $80,000</td>
<td>11%</td>
<td>56%</td>
<td>33%</td>
<td></td>
</tr>
<tr>
<td>Marital Status</td>
<td>Single</td>
<td>11%</td>
<td>54%</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>38%</td>
<td>50%</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Desired Responsibility</td>
<td>Moderate</td>
<td>15%</td>
<td>62%</td>
<td>23%</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Great deal</td>
<td>16%</td>
<td>55%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Desired Stress/Pressure</td>
<td>Very Little</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>18%</td>
<td>53%</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Great deal</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Undecided</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Desired Income</td>
<td>$40,001 - $80,000</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0.41</td>
</tr>
<tr>
<td></td>
<td>$80,001 - $160,000</td>
<td>25%</td>
<td>75%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$160,001 - $250,000</td>
<td>18%</td>
<td>41%</td>
<td>41%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; $250,000</td>
<td>0%</td>
<td>20%</td>
<td>80%</td>
<td></td>
</tr>
<tr>
<td>Desired Number of</td>
<td>&gt;20</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td>0.10</td>
</tr>
<tr>
<td>Hours per week worked</td>
<td>21 - 40</td>
<td>33%</td>
<td>67%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>41 - 60</td>
<td>14%</td>
<td>59%</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>61 - 80</td>
<td>25%</td>
<td>38%</td>
<td>38%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>81 - 100</td>
<td>0%</td>
<td>0%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>&gt; 100</td>
<td>0%</td>
<td>100%</td>
<td>0%</td>
<td></td>
</tr>
<tr>
<td>Desired Control</td>
<td>Moderate</td>
<td>25%</td>
<td>50%</td>
<td>25%</td>
<td>0.09</td>
</tr>
<tr>
<td>Over schedule</td>
<td>Great Deal</td>
<td>5%</td>
<td>62%</td>
<td>33%</td>
<td></td>
</tr>
</tbody>
</table>

were destined for a clinical medical specialty, 26% for surgical specialties, 15% for family practice, and 4% for a laboratory specialty. In an attempt to find links between career choice and certain other aspects of the respondents, comparisons were made to a number of variables, including age, debt load, marital status, number of dependents, and desired levels of family / leisure time, responsibility, stress / pressure, income, and control over schedule. This career choice data is compiled in Table 1. Please note that the percentage values shown correspond to their particular row.

Working Location:
Desired location of practice and desired living location were compared with the size of the respondent’s home community. The degree of correlation between these categories was evaluated using correlation coefficients. These results are presented in Table 2.

For the purposes of this study, a correlation was not considered strong unless the corresponding correlation coefficient was greater than 0.6. Those that fell in the range of 0.3 to 0.6 were considered moderate, and anything less that 0.3 was considered to be indicative only of a weak correlation. None of the correlation coefficients calculated in this study indicated a strong correlation and a number of correlation coefficients proved to be negative, indicating that as the values in one category rose, those of another fell. Again, these negative correlations could be classified as strong, moderate, or weak.

Gender Variations:
Many responses were also compared on the basis of gender. For instance, of the 54% of respondents headed for a clinical medical specialty, 68% were females. Of the clinical medical specialties, internal medicine was the most popular choice, picked by 23% of females and by 17% of males who chose a clinical medical specialty. Anesthesia and psychiatry were the next most popular choices, with each claiming 20%. Of the surgical specialties, general surgery
and orthopedic surgery were the two most popular choices, achieving 33% and 25% of the popular choice, respectively. Three quarters of those who picked surgery were males.

Factors Influencing Career Practice Decisions:

Finally, the respondents were also asked to rank the top five factors influencing their career practice decisions. This data was compiled and the five most frequent responses are presented below in Table 3.

A tremendous amount of data was collected based on the survey results. Following the lead set in the Results section, only the most remarkable and/or pertinent results will be discussed here.

Response Rate:

Unfortunately, the response rate for this survey, at 60%, was lower than originally hoped. It is claimed that the Dillman Total Design Method will consistently produce response rates of 75 - 80% if used properly\(^3\). Many other surveys using this method have given even better rates\(^1\). Probably one of the biggest reasons for the lower response rate in this study was that the Total Design Method was not followed exactly, with perhaps the greatest discrepancy being in the method of follow-up. In this study, only two follow-ups were made after the original sample had been sent out, unlike the three follow-ups that Dillman suggests.

Another discrepancy and possible cause of the lower response rate was the fact that the questionnaire was sent using email. This may not have made much of a difference in many cases, but target population was not typical. Fourth year medical students receive many emails and, as a result, may only read those that they deem most relevant to their situations. As well, because of their busy schedules in the hospitals, they often do not spend much time at the school, where the email is normally accessed. Another possible factor is that some may have been on external rotations during the survey period and consequently unable to complete the questionnaire.

Finally, the time allowed for the return of the samples was only about three weeks from the original mailout. Dillman suggests that the third follow-up be sent on the seventh week. This allows more than two months for the receipt of completed questionnaires from the date of the first mailout. These factors may have combined to limit the response rate to the level observed.

In light of these limiting factors, a response rate of 60% should not be considered poor. In fact, if either of these factors had not been present, that is, if more time was available for the implementation of the questionnaire or the sample population was other than busy fourth year medical students, it is suspected that the response rate could have been significantly higher.

Responses for Individual Categories:

Thirteen main categories were surveyed in the questionnaire. These included: career choice, stress / pressure, responsibility, job security, income, debt load, family / leisure time, control over schedule, retirement age, practice location, specialty choice, ranking of influential factors, and demographics. The focus of this discussion will be the tables presented earlier in the Results section.

Career Choices:

A number of factors have been shown to influence a medical student's choice of career. Those analyzed here include age at graduation, debt load, marital status, desired responsibility, desired stress / pressure, desired income, desired
number of hours worked per week, and desired level of control over schedule. These results can be found in Table 1.

AGE AT GRADUATION AND MARITAL STATUS
It has been shown that, because of familial responsibilities, older graduates and married graduates are more likely to pursue family medicine. This was seen in the data obtained in this study as well. Thirty-eight percent of the married respondents chose family practice, whereas the rate was only 11% for single respondents. As well, graduates older than twenty-six picked family practice 29% of the time and those aged 24 – 26 only picked this career path 10% of the time.

DESIRED FAMILY / LEISURE TIME AND RESPONSIBILITY
Both desired amounts of family / leisure time, measured in this study by desired number of hours worked per week, and desired level of responsibility have been shown to moderately influence career choice. In fact, nearly 63% of respondents in this study said that lifestyle considerations were at least as influential as subject matter in their career choice. Also, this category was indirectly rated the third most influential factor on career choice by them. Few would disagree that the availability of family / leisure time is a major component of a controllable lifestyle. As well, desired level of responsibility occurred more often than any other factor in Table 3. Evidently, these variables have a considerable influence on career decision making.

DESIRED LEVEL OF STRESS / PRESSURE AND CONTROL OVER SCHEDULE
Both desired levels of stress / pressure and control over schedule have been shown to have a minor influence on career choice in at least one other study. However, it is interesting to note that respondents ranked these two variables fourth and fifth highest in their decisions (see Table 3). It would seem then that, at least to the respondents in this study, these factors play more of a role than the literature would otherwise lead us to believe.

INCOME
Desired level of income ranked number five in Table 3. In other studies, though, it has only proven to influence career choice in a minor way. However, when coupled with an increasing debt load, the reason for such a high ranking may become clearer.

DEBT LOAD
Debt load is one of the most difficult variables to analyze. In some studies, it has been found to be a significant factor when it is high, and therefore causes the student a considerable amount of anxiety. It is a new trend that students are more likely to opt for higher paying careers in these instances, despite the fact that the residencies for these specialties tend to take longer. This certainly seemed to be true in this study as more people chose clinical medicine and surgery, which typically lead to higher incomes than family practice, as their levels of debt rose.

In another study, however, less than four percent of physicians said that debt had a major influence on specialty choice. About half of those who indicated that it did, though, also indicated that they had foregone some training because of it. This tends to support the idea that the pursuit of greater training with increased debt load is a relatively new trend. It is expected that this trend will continue due to the fact that debt loads are increasing while physicians’ incomes are either remaining stagnant or are being cut.

It should be noted that the results seen in this study may not be typical of all medical schools across the country. One of the main reasons for this is that Dalhousie had the second highest medical school tuition in the country (after Memorial University of Newfoundland) in 1996 – 1997. If it is indeed the case that schools with higher tuition fees tend to produce less family practitioners due to the increased levels of debt that result, one would expect that, in the near future, Ontario schools will see comparable drops due to the recent deregulation of tuition fees in that province. This remains to be seen.

Incidentally, the median debt load in this study was somewhere between $40,000 and $60,000 and most people claimed that their debt caused them at least a moderate level of anxiety. It has also been shown that debt has a significant influence on students with children (reference). But, since none of the respondents in this study had children, this factor can not be commented on here.

WORKING LOCATION
Two of the questions asked of the respondents were the population of town in which they desired to work and the proximity to a metropolitan center that they wished to live. In an attempt to understand the reasons for their choices, these responses were correlated with the population of their hometowns. It was found that only a weak correlation existed between these variables, with those whose hometown was relatively large being only slightly more likely to choose to work in and live close to a metropolitan center. The largest proportion of people stated that they would prefer to work in a city of between 50,000 and 200,000 people and live within one hundred kilometers of a metropolitan center. The proportion of people who chose these responses were 40% and 28%, respectively.

GENDER VARIATIONS
A number of variations were seen between males and females in the sample. Most notable among these were in the categories of career choice, income, debt load, and practice location. Each will be treated separately in this section.

CAREER CHOICE
Interestingly enough, there seemed to be some variation between males and females in the choice of careers. While both groups picked clinical medical specialties more often than any other career path, the males were much more likely
to pick an alternative specialty than were females. In fact, a much larger proportion of those who chose a surgical specialty were males (75%).

PRACTICE LOCATION

Another variation seen between males and females in this study was the desire to spend time practicing medicine outside of Canada. While most males (57%) said that they did not plan to spend any time practicing medicine in another country, only 32% of females stated that they had no plans of practicing medicine outside of Canada. The correlation coefficient for these variables was 0.44, or moderate.

DEBT LOAD

Males were more likely to have accumulated a higher debt load than were females. A large proportion of males fell into the debt range of $40,000 - $60,000 whereas many females fell into the lower range of $20,000 - $40,000. The correlation coefficient for this relation was 0.22.

INCOME

The greatest discrepancy between male and female expectations came in the category of expected level of income. Males were most likely to choose a level of income ranging from $160,001 - $250,000 whereas females were most likely to opt for the lower income range of $80,001 - $160,000. The correlation coefficient of 0.33 for this relation showed a moderate correlation between these variables. The reason for this may be due in part to the trend we saw earlier of higher debt loads corresponding to the pursuit of higher-paying specialties. Since there does not seem to be any information in the literature concerning this point, it is difficult to either confirm or deny this suspicion.

CONCLUSIONS

As stated above, this study represents the first step in the process of gathering data on the attitudes and expectations of graduating Canadian medical students toward their future. As a first step, it was relatively successful in achieving its goals. For instance, the survey was constructed, piloted, and refined to the point where it can be used as an effective tool for use in further steps. As well, the response rates were high enough to allow for relative reliance on the data obtained for Dalhousie Medical School as a reflection of the entire class of 1999. These results, however, cannot be used to draw conclusions on the characteristics of the other fifteen Canadian medical schools as situations in different provinces and, indeed, at different schools within a province may vary dramatically (e.g. with tuition and/or demographics). It is therefore necessary that representative samples be obtained from each school.

In future steps, it is recommended that more time be allotted for response to the survey than in this step. This would allow more of a chance to achieve greater response rates, thereby increasing the reliance on the data. As well, despite suspicions that certain variables were quite closely related, the correlation coefficients calculated with the data obtained here are not extremely high. It is suggested that more attention be given to the construction of some of the questions in order to enable a more effective correlation analysis for the remaining medical schools.

This is a study with potentially important implications for both the physicians already practicing medicine in Canada and those who will soon be entering the profession. It has been a learning process and some helpful insights have been gained with this step. The next step is to use the knowledge gained here to make appropriate changes to the process in order to ensure that the potential usefulness of this effort will be maximal.

ACKNOWLEDGEMENTS

I would like to thank Dr. Karen Mann for her guidance and support in this undertaking.

REFERENCES


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Would you like to be part of a growing organization?

William Osler Health Centre is Ontario’s largest community hospital corporation with more than 750 physicians and more than 3,800 caring staff serving a population in excess of 700,000. This population base gives William Osler Health Centre the critical mass to provide regional specialized services such as Paediatrics and Neonatology, and MRI.

Together the Etobicoke Hospital, Brampton Memorial Hospital and Georgetown Hospital Campuses provide care to Canada’s fastest growing communities. Because of this growth, the corporation has recently been given the green light by the Ministry of Health and Long-Term Care to plan for a new hospital facility in Brampton and to expand Etobicoke and Georgetown Hospital Campuses. This project represents the largest initial HSRC-directed capital investment in Ontario. This is a once-in-a-lifetime opportunity and we want you to be part of this exciting chance to shape the future of health care.

Some Milestones we have reached:

- Implementation of a five-level triage system in our emergency department
- Implementation of a project to transfer admitted emergency department patients to make sure patients get to the right place at the right time
- Increased standards of care in Paediatrics through the adoption of the Child Health Guidelines and the designation as advanced level II Paediatrics Centre
- In a province-wide report William Osler Health Centre scored a high performer in clinical areas such as cholecystectomy, hysterectomy and acute myocardial infarction

To find out how you can become part of this progressive, growing health care corporation, please contact:

Dr. Tom Dickson, Chief of Staff (905) 796-4461 or by e-mail tom_dickson@oslerhc.org.
INSTRUCTIONS FOR AUTHORS

Dalhousie Medical Journal Instructions for Authors

The Dalhousie Medical Journal will consider manuscripts in English which deal with any aspect of medicine including basic science, clinical medicine, surgery, medical education, medicolegal affairs, medical humanities and public health. An accompanying cover letter signed by all authors should state that the manuscript has not been published by another journal, nor is it under consideration by another journal.

Two (2) copies of the text are required. A camera ready copy, or disk copy, of all figures, line drawings and graphs are required as well. In addition, a disk copy in Word 98 or Word 6.0 for Mac is requested. References should be listed at the end of the paper and end-note functions should not be used.

Manuscripts should be printed on standard 22x28 cm (letter-sized) paper. Submissions should be 3000 words (approximately 15 pages double spaced) or less. This word limit does not include references or figures. Longer submissions may be considered with prior permission from the Associate Editor-Reviews and the Editor-in-Chief. Pages should be numbered consecutively.

Title page: The title page must include the following information: 1) authors’ full names, degrees and affiliations 2) first author biography 3) mailing address 4) e-mail address 5) phone number (home and work). The following information should be included if applicable: 1) pager number 2) Tupper Box # 3) fax number 4) year in educational program. To facilitate the anonymous peer review process, the title page should be the only page containing the authors names.

Abstract: The abstract should appear on the second page and should be no longer than 250 words. It should state the purpose of the paper, basic procedures, main findings and the principal conclusions.

Text, Acknowledgements: These should conform to the Uniform requirements for manuscripts submitted to biomedical journals (CMAJ 1994;150:147-154). These are on reserve in Dalhousie University’s Kellogg Library under reserve call #971.

References: References are to be numbered in the order they appear in the text. The reference section should be located after the acknowledgements at the end of the text, following the sample formats given below. Complete information should be given for each reference, including titles of journal articles, names of all authors and editors, and inclusive pagination.

Journal article

Chapter in book

Book

Tables: Tables should be numbered in the order in which they are referred to in the text. Each should have a brief title. Column headings and descriptive matter in tables should be brief.

Figures: Each figure should be planned to fit into either one or two columns of text. Photographs and illustrations must be black and white and of good quality. Figures should be numbered in the order in which they are referred to in the text. Labelling should be limited to the essential components of a figure. Figure captions should be typed on a separate page at the end of the manuscript. Electronic copies of photographs and illustrations are preferred in TIFF or PICT format (resolution should be 600 dpi), and in separate files. MS PowerPoint (97 or earlier versions) is also acceptable. Attention should be given to be certain the graphics have adequate resolution.

Drug Names: Both nonproprietary (generic) and trade names should be given for all drugs mentioned in the text.

Submission: Send manuscripts to:
Associate Editor, Reviews
Dalhousie Medical Journal, Box 398
Sir Charles Tupper Medical Building
Dalhousie University, Halifax
Nova Scotia, Canada
B3H 4H7

Manuscripts can also be dropped into the DMJ drop slot in the door to room 2L-B8 (DMSS storage room) in the Sir Charles Tupper Building (Link), Dalhousie University.
The Dalhousie Medical Journal
Needs Your Support

The Dalhousie Medical Journal is a peer-reviewed journal published by students in the Faculty of Medicine at Dalhousie University. It is the only one of its kind in Atlantic Canada. Although the Journal is financially self-sufficient based on advertising, support from our patrons allows for the development and expansion of the DMJ. The funds donated are used to equip and maintain the Dalhousie Medicine Publications Office, a joint project of the DMJ and the Dalhousie Medical Students' Society. The office is also used by the DMSS Handbook committee, the yearbook staff, and other student initiatives that require publishing assistance.

We plan to purchase a fax/printer/copier, and indeed a scanner has already been purchased with your generous support. Additionally, we pay for a variety of services including: phone and long-distance, internet access, and equipment maintenance. Continued support will allow for the operation and expansion of the Publication Office.

With your support the DMJ will continue to develop both into a forum for research relevant to the health of Atlantic Canadians and as an international forum for the highest quality medical and graduate student research. To become a Patron of the DMJ please send a cheque for $50.00 to the address on the adjacent form. You will be acknowledged as a "Patron of the DMJ" in each of the following two issues.

We would be happy to have any other support that faculty, or other physicians might like to provide. This may take the form of editorial assistance, or submission of research/review papers. We look forward to hearing from you.

Thank you for your support.
LIPITOR®
Lipid Management

EFFECTS TO REACH TARGET THE FIRST TIME

ACTORS AND CLINICAL PHARMACOLOGY

LIPITOR® (atorvastatin calcium) is a synthetic lipid-lowering agent. It is a selective, competitive inhibitor of 3-hydroxy-3-methylglutaryl-coenzyme A (HMG-CoA) reductase. This enzyme catalyzes the conversion of HMG-CoA to mevalonate, which is an early step in the biosynthesis of cholesterol.

LIPITOR lowers plasma cholesterol and lipoprotein levels by inhibiting HMG-CoA reductase and cholesterol synthesis in the liver and by increasing the number of hepatic Low Density Lipoprotein (LDL) receptors on the cell surface for enhanced uptake and catabolism of LDL particles.

LIPITOR reduces LDL Cholesterol (LDL-C) and the number of LDL particles. LIPITOR also reduces Very Low Density Lipoprotein (VLDL) cholesterol, triglycerides and Intermediate Density Lipoprotein (IDL), as well as the number of apolipoproteins A-I and B in non-fasting patients, but not C and E.

Elevated serum cholesterol due to elevated LDL-C is a major risk factor for the development of cardiovascular disease (CVD) and for coronary heart disease (CHD), particularly if due to increased LDL or associated with decreased HDL or increased LDL-C.

LIPITOR is rapidly absorbed after oral administration, maximum plasma concentrations occur within 1 to 2 hours, and the peak serum concentrations are approximately 150 to 300% of circulating inhibitory activity for HMG-CoA reductase activity is attributed to active metabolites.

LIPITOR and its metabolites are eliminated by bilateral excretion. Less than 2% of a dose of atorvastatin is recovered in the urine following oral administration. Mean plasma elimination half-life of atorvastatin in humans is approximately 14 hours, but the half-life of inhibitory activity for HMG-CoA reductase is 20 to 30 hours due to the contribution of longer-lived active metabolites.

INDICATIONS AND CLINICAL USAGE

LIPITOR (atorvastatin calcium) is indicated as an adjunct to diet in adults, at least equivalent to the American Heart Association (AHA) Step 1 diet, for the reduction of elevated total cholesterol, triglycerides, LDL-C, C, and apolipoprotein B levels in hyperlipidemic and mixed dyslipidemic conditions; when response to diet and other nonpharmacologic measures alone has been inadequate, including:

- Primary hypercholesterolemia (Type IIa)
- Combined hyperlipidemia (Type IIb), including familial combined hyperlipidemia, regardless of whether cholesterol or triglycerides are the lipid abnormality of concern.
- Hyperbetalipoproteinemia (Type IIb).
- Hyperlipidemia (Type IV).
- Familial hypercholesterolemia homosaga and heterosaga. For homosaga familial hypercholesterolemia, LIPITOR should be used as an adjunct to treatments such as LDL apheresis, or as monotherapy if such treatments are not available.

In clinical trials, LIPITOR (10 to 80 mg) significantly improved lipid profiles in patients with a wide variety of hyperlipidemic and dyslipidemic conditions. In doses response studies in mildly to moderately hyperlipidemic patients (baseline LDL-C levels 100-154 mg/dL), LDL-C reductions were seen of 25-41%, LDL-C (10-40% apo B (20-50% TG (19-57%), and increased high density lipoprotein cholesterol (HDL-C) levels (5-9%). Comparable responses were achieved in patients with heterozygous familial hypercholesterolemia, non-familial forms of hypercholesterolemia, combined hyperlipidemia, and familial hypercholesterolemia heterosaga with non-reduced serum lipoprotein a levels.

In patients with hyperlipidemia (Type II) LIPITOR (10 to 80 mg daily) reduced TG (25-56%) and LDL-C levels (21-44%) in a dose dependent manner, which characteristics Type I and IIa have not been studied in clinical studies in patients with high TG levels (>11 mmol/L).

In an open-label study in patients with diabetes and dyslipidemia (Type IIb) LIPITOR (10 to 80 mg daily) reduced total C (41-57%), TG (45-55%) and HDL-C (13-20%).

In an open-label study in patients with homozygous familial hypercholesterolemia (FH) (LIPITOR 10 to 80 mg daily) reduced LDL-C levels (27%). In a post study, LIPITOR 80 mg showed a mean LDL-C lowering of 33% for patients with disease, and 31% for patients who were controlled or hyperlipidemic, and 33% for patients who were controlled or hyperlipidemic.

For more details on efficacy results by pre-defined classification and pooled by fibrinoprotein base, see PHARMACOLOGY, Clinical Studies.

Prior to initiating therapy with LIPITOR, secondary causes should be excluded for reductions in plasma lipids (e.g., poorly controlled diabetes, hypothyroidism, obesity, hypertensive, hypothyroidism, obstructive liver disease, and alcoholism), and a lipoprotein profile performed to measure total cholesterol, triglycerides, and HDL-C, and TC. For patients with TG >5.4 mmol/L (≥400 mg/dL), LDL-C can be estimated using the following equation:

LDL-C (mmol/L) = total C - (0.817 x TG/5.2)

or

LDL-C (mg/dL) = total C - (0.22 x [TG] / 5.2) = HDL-C + TG.

For patients with TG levels >5.4 mmol/L (≥400 mg/dL), this equation is less accurate and LDL-C concentrations should be measured directly or by ultracentrifugation.
Primary Hypercholesterolemia and Combined (After) Hyperlipidemia, Including Familial Combined Hyperlipidemia

The recommended dose of LIPIANO® 10 mg once daily is initially 20 mg (10 mg tablets) of the active substance. The maximum dose is 40 mg (two 20 mg tablets). The maximum daily dose is 40 mg.

Lipid levels should be monitored periodically, and if necessary, the dose of LIPIANO® adjusted based on the target lipid levels recommended by guidelines. The following reductions in total cholesterol and LDL-C levels have been observed in dose-response studies, and may serve as a guideline to treatment of patients with mild to moderate hypercholesterolemia:

<table>
<thead>
<tr>
<th>Lipid Level</th>
<th>Percent Change from Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total-C</td>
<td>7.1 mmol/L</td>
</tr>
<tr>
<td>LDL-C</td>
<td>4.9 mmol/L</td>
</tr>
</tbody>
</table>

• Results are pooled from 2 dose-response studies.

Pharmacokinetic parameters:

Lipid lowering: Efficacy of LIPIANO® was reduced from 4% to 16%

Gastrointestinal P 450-mediated interactions: Enzyme is metabolized by the cytochrome P 450 isoenzymes, CYP 3A4, CYP 2C19, CYP 2C19 expressed in human liver, duodenal ulcer, in human liver, duodenal ulcer, in human liver, duodenal ulcer, in human liver, duodenal ulcer, in human liver.

Kidney: In healthy volunteers, clearance of atorvastatin by approximately 20%. Patients taking diuretics should be monitored closely and appropriately.

Adverse effects: Diarrhea, constipation, abdominal pain, nausea, flatulence, headache.

Other Concomitant Therapy: In clinical studies, LIPIANO® was used concurrently with antihypertensive agents, and no evidence of additive or potentiation replacement therapy was observed. Evidence of clinically significant adverse reactions to LIPIANO® was not observed.

Drug/Laboratory Test Interactions: LIPIANO® was well-tolerated. Adverse reactions were not significantly more frequent than placebo in the placebo-controlled studies. The incidence of adverse events reported in the placebo-controlled trials of LIPIANO® are presented in Table 1.

Table 1. Adverse Events in Placebo-Controlled Clinical Trials

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LIPID LEVELS

LIPIANO® lowers total cholesterol by approximately 10% and LDL-C by approximately 30%.

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Acetaminophen: In healthy volunteers, co-administration of multiple 10 mg doses of NOSIVAX with 80 mg of acetaminophen resulted in no adverse effects on the response to the vaccine in the case of acetaminophen.

ADVERSE REACTIONS
NOSIVAX (amiodine beseylate) has been administered to 1,174 patients (805 hypertensive and 905 normotensive) in controlled clinical trials (less placebo and with active comparative agents). Most adverse
hypertension

In the 85 hypertensive patients treated with NOSIVAX in controlled clinical trials, adverse effects were reported in 29.5% of patients and required discontinuation of therapy in 1% of patients. The most common
hypertension

Cardiovascular: edema (0.8%), palpitations (0.6%), tachycardia (0.6%), postural dizziness (0.5%). Skin and
hypertension

Adverse events reported in patients receiving NOSIVAX in controlled clinical trials in 1909 patients treated with NOSIVAX, adverse effects were reported in 38.5% of patients and required discontinuation of therapy in 0.8% of patients. The most common adverse
hypertension

Increased Aegnus and/or Myocardial Infarction

Uncommon: manifesations of obstructive coronary artery disease, they have developed documented increased frequency, duration and/or severity of angina or acute myocardial infarction on starting calcium channel blocker therapy or at any time during therapy. The mechanism of this effect has not been elucidated.

Outflow Obstruction (Aortic Stenosis)

This medication can be used with caution in a patient with pre-existing left ventricular outflow obstruction (aortic stenosis).

Use in Patients with Impaired Hepatic Function

There are no controlled studies in patients with liver disease. However, the prohibition of a drug is not absolute, and in extremely poor conditions it may be advisable to start the treatment of angina or hypertension in patients with concomitant heart failure.

Use in Pregnancy

Although antidiode was not teratogenic in the rat and rabbit, some dihydroxyproline compounds have been found to be teratogenic in animals. In rats, antidiode has been shown to prolong the gestation period and the duration of labor. There is no clinical experience with NOSIVAX in pregnant women. The drug should be used only if the benefit potential outweighs the potential risk to the mother and fetus.

Nursing Mothers

It is not known whether antidiode is excreted in human milk. Since antidiode safety in newborns has not been established, NOSIVAX should be used only if the benefit potential outweighs the potential risk to the mother and fetus.

Use in Children

The safety and efficacy of NOSIVAX have not been established in children. Use in Elderly

In elderly patients (aged 65 years or over) the clearance of antidiode is decreased with a resulting increase in AUC. In clinical trials, the incidence of adverse reactions in elderly patients 65 years or over was 6% higher than in younger patients. It is important to take into account that the dosage of hypertensive patients may need to be adjusted.

Interaction with Grapefruit Juice

Grapefruit juice contains a variety of inhibitory factors that may affect the metabolism of the calcium channel blockers. As a result, antidiode may cause an increase in plasma levels and an increase in hypotensive effects of some dihydroxyproline calcium channel blockers. Following oral administration of 15 mg amiodine in 20 male volunteers, pharmacokinetics of amiodine were similar when antidiode was administered with and without grapefruit juice.

Drug Interactions

As with all drugs, care should be exercised when treating patients with multiple medications. Dihydroxyproline calcium channel blockers undergo biotransformation by the cytochrome P450 system, mainly by CYP3A4 isoenzyme. Association of amiodine with other drugs which use the same route of biotransformation may result in altered biotransformation of amiodine or these drugs. Doses of similarly metabolized drugs, particularly those of low therapeutic ratio, and especially antihypertensives and digitalis and/or hypotensive impact, may require adjustment when starting or stopping co-administered amiodine to maintain optimal therapeutic blood levels. Drugs known to be inhibitors of the cytochrome P450 system include: azole antifungals, cimetidine, cyclosporine, erythromycin, quinidine, terfenadine, warfarin.

Drug Definites

NOSIVAX (amiodine beseylate) may be used in patients with decreased renal clearance. NOSIVAX should be administered with caution to patients with renal impairment as the metabolism of amiodine may be impaired. The safety and efficacy of NOSIVAX have not been established in patients with impaired renal function.

In patients with impaired hepatic function, NOSIVAX should be used with caution.

NOSIVAX (amiodine beseylate) is contraindicated in patients with impaired hepatic function.

NOSIVAX (amiodine beseylate) should be used with caution in patients with decreased renal function.

NOSIVAX (amiodine beseylate) should be used with caution in patients with a history of cerebrovascular insufficiency, and those taking medications known to lower blood pressure.

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REFERENCES