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# Student scientific activity at the Bratislava medical faculty 2000-2004. A scientometric study

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**Abstract:** Students at the Bratislava medical faculty interested in research can participate voluntarily in a student scientific activity (SSA). Currently, the scientific activity is measured by the quantity and quality of publications and these scientometric parameters are important for grant evaluations as well as for individual careers. In this study, we evaluate the publication successes of SSA papers presented at the SSA conference (SSAC) of Faculty of medicine in Bratislava during the last five years. Names of the first authors of works presented at the SSAC in 2000-2004 were searched in PubMed/Medline and in Thomson ISI Web of Science/Current Contents (CC) in January 2005. Only titles of full text publications (not abstracts) similar to those presented at the SSAC were counted and further analyzed. Publication points were counted according to the currently valid PhD credit system at the Faculty of Natural Sciences, Comenius University, Bratislava. A total of 141 students scientific activity works were presented during a five-year period, with a total of 4 domestic non-CC, 11 foreign non-CC and 9 foreign CC publications, with cumulative impact factor 10,6 and total publication points of 641,2. Publication points gradually increased during the years 2000 – 2003. In conclusion, medical student research activity can significantly influence the publication output of our medical faculty and should, thus, be further supported. The SSA will probably gain even more importance after the introduction of a mandatory diploma thesis, moreover, if we take into account the increasing significance of evaluations based on scientometric parameters.


*Keywords: Student scientific activity, Comenius University, PubMed/Medline, Current Contents, impact factor, scientometric evaluation*

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## 1 Introduction

According to a survey by Stimmel [1] most medical students and faculty members agree that research, either of a basic scientific or a clinical nature, is helpful in preparing all students for the practice of medicine, regardless of ultimate career choice. Opened questions are: how this should be implemented in the medical curriculum, how much time should be reserved for this and whether research should be mandatory or on an elective basis [2]. The pros and cons of voluntary and mandatory medical student research activity also open a lot of questions.In Germany, medical students have to perform research to acquire the degree of „*Doctor medicinae*“, whereas research activity is voluntary for example in the USA. So generally there are two approaches to students' scientific research activity: voluntary and mandatory. Some medical faculties use a combined approach, which means that faculty include mandatory coursework on principles of scientific work in their pregradual curriculum, but research work itself is voluntary for students[3].

Until recently, Slovakia was among the countries where all students obtain the degree „*Doctor medicinae*“ automatically after graduating from university, which led to a lower proportion of student research, but it was on voluntary basis. Nevertheless, student research supports medical research as a whole, both in terms of quality and quantity, which was recognized by the Deans of Medical faculties throughout Slovakia, and the students research activity was highly supported by the means of conference and competition [4].

History of students' scientific activity (SSA) at Bratislava Medical Faculty goes back to the school year 1948-1949, when the first competition under the name of „Youth Creativity Contest“ was held. Since then, support of SSA by the heads of Medical faculties underwent several changes. The modern history of SSA goes back to the year 1994, when the first SSA conference (SSAC) after the year 1989, with only 5 papers was held. Since 1997, the SSAC is held yearly [4].

In this work, we have tried to evaluate the published scientific output of papers presented at the SSA of the Medical faculty of Comenius University in Bratislava, Slovakia during the last five years.

## 2 Methods

Participants of the SSAC 2000-2004, their affiliations, and the titles of their studies were assessed using leaflets of conference programs. Studies were classified into clinical and pre-clinical, if not already classified in the SSAC program. If more than one affiliation were reported, the first affiliation was included in the analysis. Names of the first authors were searched in PubMed/Medline and in Thomson ISI Web of Science/Current Contents (CC) in January 2005. Only titles of full text publications (not abstracts) similar to those presented at the SSAC were counted and further analyzed. Publication points were counted according to the currently valid PhD credit system at the Faculty of Natural Sciences, Comenius University, Bratislava. Publications in Slovak non-CC journals – 20 points, in foreign non-CC journals – 24 points, in CC-journals 28 points + 28 points x

impact factor of the journal according to the journal citation report 2003.

## 3 Results

Descriptive statistics of SSA works presented on SSAC within the years of 2000-2004, as well as the overall statistics are shown in Table 1. Totally141 SSA works were presented during a five-year period, with a total of 4 domestic non-CC, 11 foreign non-CC and 9 foreign CC publications, with a cumulative impact factor 10,6 and total publication points of 641,2.

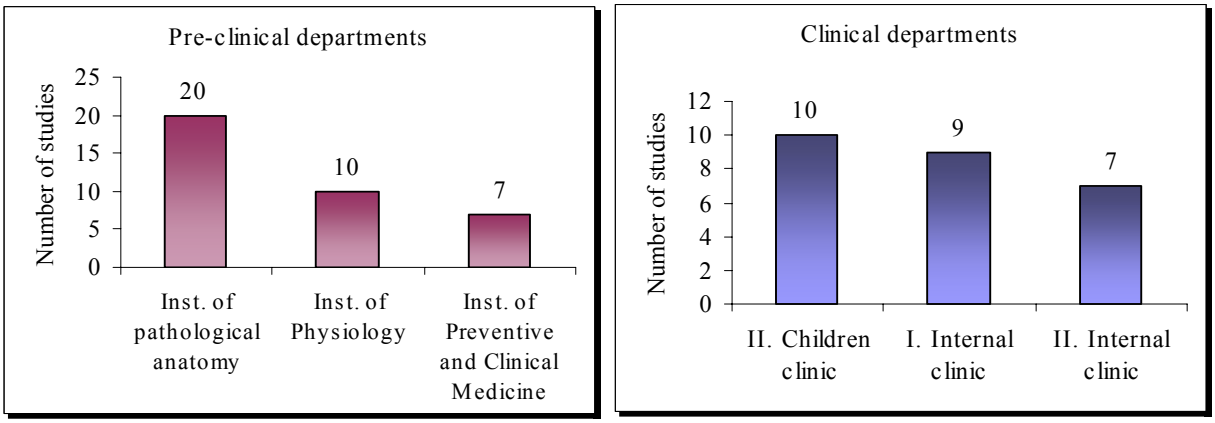
**Table 1** Year and overall SSAC statistics within the years 2000 – 2004.

| Year | Number of SSA works | DNC | FNC | DC | FC | cIF | Publication points |
|---|---|---|---|---|---|---|---|
| 2000 | 27 | 3 | 2 | 0 | 0 | 0,0 | 108,0 |
| 2001 | 25 | 0 | 1 | 0 | 4 | 3,7 | 126,2 |
| 2002 | 31 | 0 | 5 | 0 | 1 | 1,1 | 151,2 |
| 2003 | 35 | 0 | 1 | 0 | 4 | 5,8 | 187,7 |
| 2004 | 23 | 1 | 2 | 0 | 0 | 0,0 | 68,0 |
| Overall | 141 | 4 | 11 | 0 | 9 | 10,6 | 641,1 |

DNC – number of domestic non-CC publications,
FNC – number of foreign non-CC publications,
DC – number of domestic CC publications,
FC – number of foreign CC publications,
cIF – cumulative impact factor.

Interestingly, publication points gradually increased during the years 2000 – 2003. The least publication points were gained by SSA works presented in 2004 SSAC. Although students from the Institute of Pathological Anatomy had presented the most studies at SSAC (Fig. 1a), the highest publication activity showed students from the Institute of Physiology with 145 publication points, followed by the Institute of Pharmacology (134 points) and the Institute of Medical Chemistry, Biochemistry and Clinical Biochemistry with 115 points (Fig. 2). The Second Children Department leads the clinical departments' competition for number of studies with 10 studies presented at SSAC during years 2000 – 2004 (Fig. 1b). SSA works coming from pre-clinical departments were published preferably in foreign non-CC and CC journals in comparison to SSA works coming from clinical departments (Fig. 3).

Regarding the place taken in SSAC, it is interesting that studies that took place in second and third order reached the more publication points than studies which were placed as first (Fig. 4). Moreover, second and third order SSA papers were published more in foreign non-CC and CC journals and gained a higher cumulative impact factor than SSA works placed in first order (Fig. 5).




a) b)

**Fig. 1** Pre-clinical (a) and clinical (b) departments with highest number of SSA works presented at SSAC.

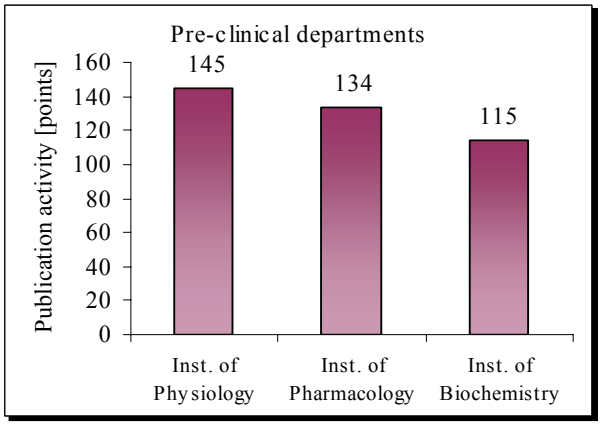



**Fig. 2** Pre-clinical departments publication activity.

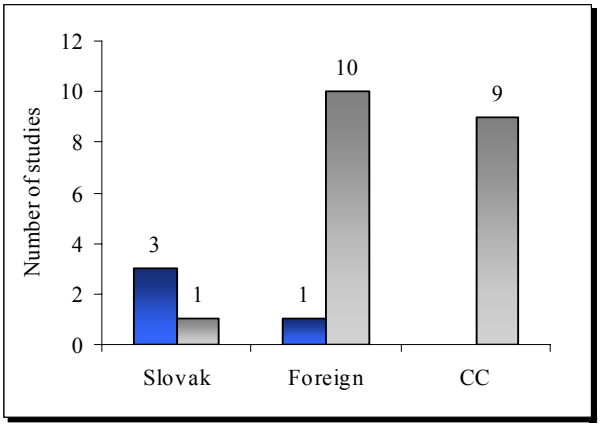



**Fig. 3** Comparison of pre-clinical and clinical SSA studies and where they were published. Blue boxes represent clinical and gray boxes pre-clinical SSA studies.

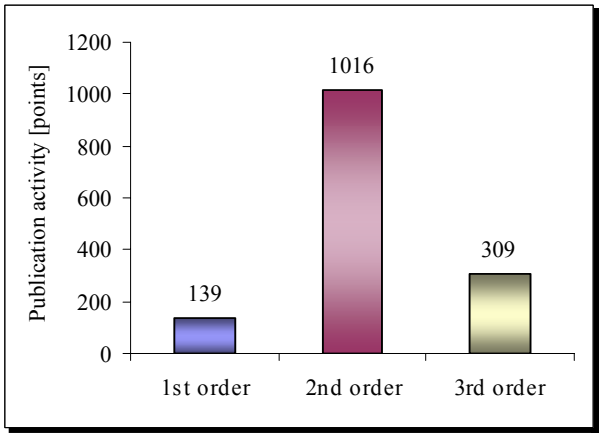



**Fig. 4** Publication points from the view of taken place at SSAC.

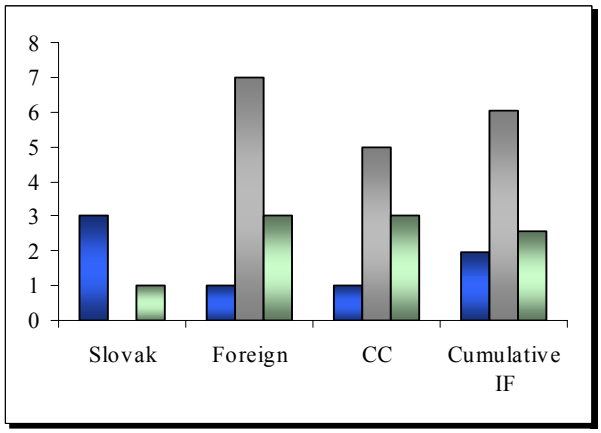



**Fig. 5** Journal publication type and cIF from the view of taken place at SSAC. Blue boxes represent $1^{st}$ order, gray boxes $2^{nd}$ order and green boxes $3^{rd}$ order publications.

## 4 Discussion

Generally, two models of medical student research activity coexist: voluntary, as in Britain or in the USA, and mandatory, as in Germany [5]. In countries where student research activity is voluntary, the hidden danger is shown in an example from the USA, which is considered a country of all opportunities including science. Nevertheless, during the past decade there has been increasing recognition that the number of physician–scientists in the United States is decreasing alarmingly. Dr. Leon Rosenberg postulated that if the number of physicians applying for research grants from the National Institutes of Health (NIH) were to continue to decrease at the present rate, by 2013 there would be no first time physician applicants for NIH support [6].

Slovakia, until recently, belonged to the group of countries where student scientific activity on medical faculties was on a voluntary basis. The conditions for scientific work (not to mention students' scientific work) were pitiful. However, SSA at the Bratislava medical faculty was supported by its deans by the means of conferences and competition

prizes for the best presented student research work [4]. Is the fate of young Slovak scientists similar to that of young American scientists? We took 5 consecutive years (2000 – 2004), and we found out that the overall number of presented works in SSAC was 141. We cannot say if this is many or not. The more important question here should be, what happened to these presented works after the conference was over. The high contribution of medical students to published papers would reflect their impact on the work preceding the publication. It is therefore praiseworthy that the publication points were increasing over years 2000 – 2003. Publication points from SSA studies presented in 2004 SSAC is about half of the year 2000 (Tab. 1). This is a negative result and one can consider it as a step back, however, we must realize that the year 2004 has not been over for long, and many papers from the 2004 SSAC could be still under consideration by journals. The peer review process can take quite a long time and authors are not encouraged to send their papers for consideration to more than one journal a time [7]. Moreover, it has to be kept in mind that some results of medical student research are first presented at national or international meetings, where abstracts may be published, but which are not included in the analysis. In addition, some papers can be published in non-indexed journals. However, these publications are not of significance for scientometric evaluation in scientifically developed countries.

Secondly, when we took a closer look and tried to evaluate which departments are most active, we found that generally, pre-clinical departments produce more presentations at SSACs, perhaps because they produce more opportunities for SSA (Fig. 1a, Fig. 1b). Many presentations at SSACs, however, do not necessarily mean higher publication activity. The Department of Pathological Anatomy showed 20 presented works at SSACs during observed 5 years; nevertheless, it was the Department of Physiology as a pre-clinical department that took the advantage of SSA and gained the highest publication points during the years 2000 – 2004 (Fig. 1a, Fig. 2). On the other hand, we must point out, that there could be some unreliability in our findings. Many students, especially women, in the second half of the study at university are an age that is suitable for getting married. This yields the problem that we could not solve, and that is the change of the women surnames. Since, as we mentioned above, the peer-review process can take a long time, by the time their papers are accepted, women could get married and thus change their surnames. Then, in Medline/CC databases we might not find the appropriate surname used at the time of SSAC.

Finally, the SSACs are supposed to be a competition conference, where all the works presented are sorted into three categories: SSA studies of first, second and third order, with first order as highest valuation. Studies of first order are to be the highest quality. It is interesting, though, that it was mostly studies of second and third order, which were published in foreign non-CC and foreign CC journal, thus gaining the higher publication points and cumulative impact factor in comparison to studies of first order. It has to be said that there can be only three SSA studies of first order; the rest is divided into second and third order. Therefore, it is possible that the second and third order SSA works simply outnumbered the first order studies.

In conclusion, this study confirms the finding of other international investigations regarding the attitude of students to research [8]. Moreover, it shows that voluntary medical student research activity not only provides an opportunity for students to develop an investigative approach to medical problems, but can also contribute substantially to the research activity and the published scientific output of a Medical Faculty of Bratislava, although the portion of published articles among the SSA works is lower than in Croatia [9]. This could be of special interest in the light of the current discussion about allocating funds in the health system and in biomedical research.

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## References

[1] B. Stimmel: "Faculty attitudes toward a thesis requirement as a prequisite to obtaining a medical degree", *J. Med. Educ.*, Vol. 51(6), (1976), pp. 508–510.

[2] D. Hren, I.K. Lukic, A. Marusic, I. Vodopivec, A. Vujaklija, M. Hrabak et al.: "Teaching research methodology in medical schools: students' attitudes towards and knowledge about science", *Med. Educ.*, Vol. 38(1), (2004), pp. 81–86.

[3] A. Marusic and M. Marusic: "Teaching students how to read and write science: a mandatory course on scientific research and communication in medicine", *Acad. Med.*, Vol. 78(12), (2003), pp. 1235–1239.

[4] M. Bernadic, B. Mladosievicova and P. Traubner: "Students' research and scientific activity at the Faculty of Medicine", *Comenius University in Bratislava. Bratisl. Lek. Listy*, Vol. 105(7-8), (2004), pp. 281–284.

[5] C. Cursiefen and A. Altunbas: "Contribution of medical student research to the Medline-indexed publications of a German medical faculty", *Med. Educ.*, Vol. 32(4), (1998), pp. 439–440.

[6] K. Zier and A. Stagnaro-Green: "A multifaceted program to encourage medical students' research", *Acad. Med.*, (2001), Vol. 76(7), pp. 743–747.

[7] G. Brill and A. Yarden: "Learning biology through research papers: a stimulus for question-asking by high-school students", *Cell. Biol. Educ.*, Vol. 2(4), (2003), pp. 266–274.

[8] D. Hren, I.K. Lukic, A. Marusic, I. Vodopivec, A. Vujaklija, M. Hrabak and M. Marusic: "Teaching research methodology in medical schools: students' attitudes towards and knowledge about science", *Med. Educ.*, (2004), Vol. 38(1), pp. 81–86.

[9] I. Kolcic, O. Polasek, H. Mihalj, E. Gombac, V. Kraljevic, I. Kraljevic and G. Krakar: "Research Involvement, Specialty Choice, and Emigration Preferences of Final Year Medical Students in Croatia", *Croat. Med. J.*, Vol. 46, (2005), pp. 88–95.