

Ph.D. TRAINING IN CLINICAL RESEARCH AND Ph.D. THESES BASED ON PUBLISHED PAPERS AT THE UNIVERSITY OF SPLIT SCHOOL OF MEDICINE

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1. Postgraduate study at University of Split School of Medicine (USSM)

Medical studies started in Split in 1974 as a branch of Medical Faculty University of Zagreb. USSM [1] was founded as independent entity in 1997 and in 1999 postgraduate training started with program “Basic and clinical medical sciences” with 3 programs: Clinical physiology, Sport medicine and Clinical medicine. These courses could finish with either M.Sc. or Ph.D. degree. With implementation of Bologna reform (in 2003) M.Sc. degree is not awarded any more and postgraduate study can be either doctoral training or professional postgraduate study for specialization in special field. At USSM there are currently three Ph.D. programs running:

1. **Applied Physiology** (2007-), the double degree international Ph.D. study of USSM; Medical faculty Trondheim, Norway; Medical College of Wisconsin, MCW and Mayo Clinic College of Medicine, Mayo; USA, The emphasis is placed on integrative clinical physiology [2].
2. **Biology of neoplasia** (2008-), the joint Ph.D study of USSM, Ruđer Bošković Institute, Zagreb, University of Dubrovnik and University of Zadar. The program comprises of basic courses based mainly on molecular biology of cancer and clinically orientated courses.
3. **Evidence based clinical medicine (EBM)** (2008-), Compulsory courses offer knowledge needed for understanding and implementation of EBM as well as for understanding the meaning of research work and general research methodology. Around 80% of elective courses are specialized, i.e. students are taught how to use EBM within a specific area of clinical medicine, whereas the remaining 20% of the courses are methodological. As a rule, specialized elective courses cover important clinical issues in a specific clinical branch by using selected examples and EBM methods. Students become familiar with EBM methods, including specific characteristics of particular clinical branch (special databases, web pages, specialized journals), through solving clinically important problems, given by teacher or selected by students [3].

At the moment we are organizing a program entitled **Clinical epidemiology**, professional postgraduate study. The student from this study may enter Ph.D. program if they complete some supplementary courses from Ph.D. programs.

The first Ph.D. in Split was awarded in 2002. Up to now 49 Ph.D. degrees were awarded (table 1) and the Ph.D. students have published altogether 234 papers in journals indexed in Current Contents (CC) journals from the research presented in their theses.

Table 1. Number of Ph.D. awarded annually at USSM

2002	2003	2004	2005	2006	2007	2008	2009	Total
2	3	1	7	7	10	9	10	49
46 Ph.D. proposals are in processing								

2. Procedure and regulations towards awarding Ph.D. degree

The Committee for Doctorate has a central role in the process of awarding Ph.D. It is the consultative committee to the Faculty Academic Council with aims to supervise the entire Ph.D. procedure, particularly regarding criteria, to analyze generally Ph.D. proposals regarding scientific background and prospective scientific importance and to perform the critical appraisal of a Thesis Committee report. The Committee for Doctorate proposes to the Faculty Academic Council the members of the Thesis Committee and gives the opinion on its report regarding Ph.D. thesis proposal and Ph.D. thesis.

The Ph.D. procedure has two steps: public defense and acceptance of Ph.D. thesis proposal (Fig.1) and public defense and acceptance of Ph.D. thesis (Fig.2). The great care is dedicated to the first step, as a part of Ph.D. education. The Committee for doctorate and the Thesis Committee return the inappropriate proposals to candidate for improvement with detail appraisal and precise instructions for improvement. Public defense of the Ph.D. proposal gives opportunity for discussion in which the reviewers and auditorium (Ph.D. students, Faculty members) give valuable comments and suggestions.

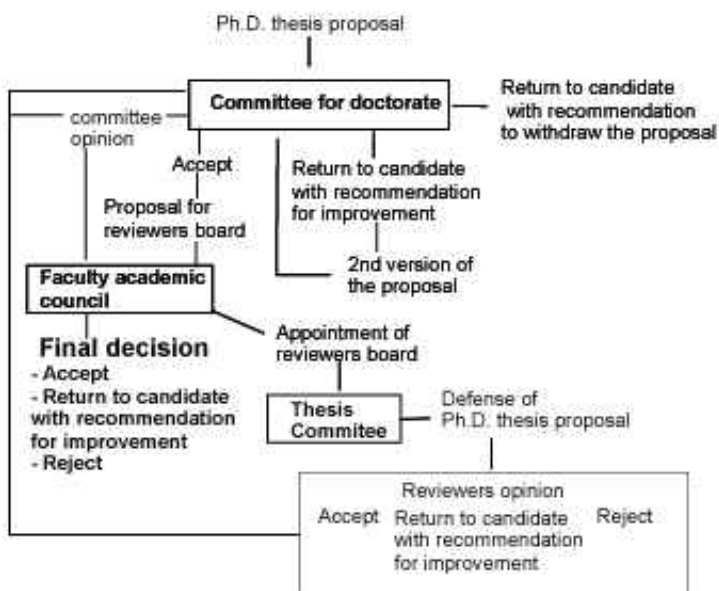


Fig.1. Ph.D. procedure: acceptance of a Ph.D. thesis proposal.

The central role in Ph.D. procedure has the Committee for Doctorate. It generally evaluates the proposal, and it can be accepted, returned to candidate for improvement or recommended to withdraw. If the proposal is acceptable, the Committee proposes to the Faculty Academic Council members of the Thesis Committee for defense of proposal and evaluation of the proposal. The Committee for Doctorate critical appraises the Thesis Committee report and with its opinion forwards it to Faculty academic council to final decision

Requirements for application for Ph.D. thesis are shown in table 2.

Table 2. Requirements for application of PhD thesis

1. PhD students after first year of PhD study.
2. Persons with scientific achievement fulfilling the requirements for a scientific degree:
 - 6 published papers, 4 of them in CC journals
 - 2 of them published in CC journals with $IF > 1$, and in one of them to be first author
 - 2 of CC papers have to be published in last 3 years.
3. Persons with M.Sc. degree (entered MS study before Bologna reform) who have published at least one paper in CC journals as first or second author



Fig.2. Ph.D. procedure: evaluation of Ph.D. thesis and defense. The Thesis Committee evaluates the Ph.D. thesis and public defense of the thesis. The Committee for Doctorate critically appraises the Thesis committee report and with its opinion forwards it to Faculty academic council to final decision.

The candidate can apply for either monographic type of Ph.D. thesis based on proposed investigation or to integrate already published papers treating a mutual topic (Scandinavian model) (table 3). Integration of the papers has to give a new scientific contribution.

Table 3. Composition of Ph.D. thesis based on published papers
1. Introductory text integrating methods, results, discussion and conclusions of the papers (no more than 30 pages). 2. Copies of at least 3 papers which - makes integral whole, - published in CC journals with $IF > 1$ in which the applicants is a first author, - one of the papers must be published within last three years.

Until now two these Ph.D. thesis were defended, one clinical (cardiology) and one basic (embryology) (table 4).

The guarantee of quality of Ph.D. training and thesis are published papers as a requirement for defense of Ph.D. thesis. Ph.D. students have to publish two papers in CC journals with $IF > 1$. One of them has to be from the thesis topic. Candidates with M.Sc. degree have to publish one paper from the thesis topic in a CC journal with $IF > 1$. In paper from the thesis topic candidate has to be the first author or second if the mentor is the first.

3. Difficulties in Ph.D. procedure

There are two major difficulties: inadequate mentorship and inappropriate peer review of Ph.D. thesis proposal and Ph.D. thesis by members of Thesis Committees. We are trying to ameliorate the difficulties and improve the Ph.D. quality in various ways. Mentors can't be members of Thesis committees and they are requested to follow the mentor guidelines and to give detail periodical report on student's progress.

Table 4. Examples of Ph.D. thesis based on published papers**Viktor Čulić: Acute risk factors for development of acute myocardial infarction (in Croatia) Split 2007**

Integrated papers:

1. Mirić D, Eterović D, Giunio L, Dujčić Ž, Fabijanić D, Hozo I, Kuzmanić A, Božić I, Čulić V. Triggers of acute myocardial infarction regarding its site. *Int J Cardiol* 1997;60:67-71
2. Čulić V, Eterović D, Mirić D, Rumboldt Z, Hozo I. Gender differences in triggering of acute myocardial infarction. *Am J Cardiol* 2000;85:753-6.
3. Čulić V, Mirić D, Eterović D. Different circumstances, timing, and symptom presentation at onset of Q wave versus non-Q wave acute myocardial infarction. *Am J Cardiol* 2002;89:456-60.
4. Čulić V, Eterović D, Mirić D. Meta-analysis of possible external triggers of acute myocardial infarction. *Int J Cardiol* 2005;99:1-8.

Dominko Carev: The involvement of apoptotic factors, growth factors and intermediate filament proteins in early human kidney development (in Croatia) Split 2008

Integrated papers:

1. Carev D, Krnić D, Saraga M, Sapunar D, Saraga-Babić M. Role of mitotic, pro-apoptotic and anti-apoptotic factors in human kidney development. *Pediatric Nephrology* 2006;21:627-36.
2. Carev D, Saraga M, Saraga-Babić M. Expression of intermediate filaments, EGF and TGF-alpha in early human kidney development. *Journal of Molecular Histology* 2008;39:227-35
3. Carev D, Saraga M, Saraga-Babić M. Involvement of FGF and BMP family proteins and VEGF in early human kidney development *Histology and Histopathology* 2008;2:853-62

The critical appraisal of Thesis Committee report by the Committee for Doctorate, which acts like editorial board in journals, improves reliability of the procedure. However, requirement of published papers as prerequisite for Ph.D. thesis defense and Ph.D. thesis based on integration of published papers are the most important for Ph.D. qualities improvement.

4. Conclusion

Ph.D. programs at USMS follows Orpheus recommendations:

- the programs are highly clinically orientated;
- requirement of two published papers in CC journals as prerequisite for Ph.D. thesis defense and Ph.D. thesis based on published papers are guarantee for quality of the Ph.D. training and thesis.

Ph.D. students' mobility and interfaculty cooperation are not sufficiently developed.

References:

1. <http://www2.mefst.hr/> (accessed 12 March 2009)
2. <http://www.bsb.mefst.hr/postdoc/index.html> (accessed 12 March 2009)
3. http://www2.mefst.hr/UserDocsImages/pdf/PhD_EBM_Program_02_05_2008.pdf (accessed 12 March 2009)