

Education of clinical chemistry and laboratory medicine in Hungary



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HUNGARIAN LABORATORY MEDICINE: THE WALL OF FAME

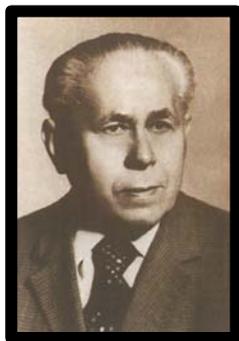
- László Udránszky (1862-1914)
- Mihály Somogyi (1883-1971)
- Kálmán Pándy (1868-1945)
- Loránd Jendrassik (1896-1970)
- György Hevesy (1885-1966; Nobel Prize 1943)
- Albert Szent-Györgyi (1893-1986; Nobel Prize 1937).
- Detection of carbohydrates in urine
- Postprandial insulin hypersecretion („the Somogyi effect”)
- Detection of CSF globulins
- Detection of serum bilirubin
- Development of radioactive isotopes as tracers
- The role of di-carboxylic acids in metabolism and the role of ascorbic acid (Vitamin C) in the peroxidase system



Presidents of the Hungarian Society of Laboratory Medicine



P. Bálint



G. Putnoky



M. Miltényi



K. Jobst



L. Muszbek



G.L. Kovács



A. R. Horváth



J. Kappelmayer



G.L. Kovács



É. Ajzner

THE STRUCTURE 2004 → 2014



POPULATION: 10.0 → 9.8
MILLION

UNIVERSITY CHAIRS: 3 → 4

HOSPITALS: 154 → 87

CLINICAL LABORATORIES:
454 → 250

TESTS/YEAR: 182 → 300
MILLION

MD: 528 → 350

NON-MD: 357 → 280

TECHNICIANS: 3986

THE DISCIPLINE



- CLINICAL CHEMISTRY: YES
- HEMATOLOGICAL DIAGNOSTICS: YES
- HEMOSTASEOLOGY: YES
- TRANSFUSION MEDICINE: NO
- IMMUNE DIAGNOSTICS: YES
- ENDOCRINE DIAGNOSTICS: YES
- TDM: YES
- MOLECULAR DIAGNOSTICS: YES
- MICROBIOLOGY: YES/NO

UNIVERSITY CHAIRS: INSTITUTES OF LABORATORY MEDICINE

- BUDAPEST
- DEBRECEN
- PÉCS
- SZEGED

- Teaching in general medicine, pharmacy, clinical laboratory scientist (MSc), clinical laboratory analysts (BSc), molecular biology, biotechnology.
- Postgraduate training (medicine, pharmacy, clinical biochemistry)
- Research, PhD programs
- Hospital service at the tertiary care level



QUALITY GUARANTEE



- EARLY FORM OF EXTERNAL CONTROL: 1973-
- ON-SITE INSPECTIONS (ISO-GUIDE 25): 1989-
- MANDATORY PARTICIPATION IN AN EXTERNAL QUALITY CONTROL SCHEME: 1996-
- QUALITY MANUAL: MANDATORY SINCE 1996
- CONTINUOUS EDUCATION:
 - MD, PHARMACIST, CHEMISTS: MANDATORY
 - TECHNOLOGIST: MANDATORY

Undergraduate medical students

„Good medicine does not consist of the indiscriminate application of laboratory examinations to a patient, but rather ..having ...to know what tests may be of value.



It should be the duty of every hospital to see that no house officer receives his diploma unless he has demonstrated a knowledge of how to use the results in the study of a patient."



Peabody Boston Med. Surg. J. 187, 432, 1922

Teaching of clinical biochemistry has to fulfil two sets of functions



1. To provide general information about the biochemical basis of disease, and about the principles of laboratory diagnosis, both for conditions with a biochemical pathogenesis and for disease states in which biochemical derangements occur as secondary manifestations.
2. To supply specific guidance on the clinical value of chemical investigations, indicating their range of applications and limitations as well as relating results of laboratory tests to the processes of clinical diagnosis and management as this might apply to individual.

(Courtesy of Prof. J. Kappelmayr)

Knowledge:

Pathological regulation in diseases and their laboratory diagnostic aspects, available laboratory assays for diagnosis and monitoring.

Obtaining and transporting biological specimen, possible preanalytical variables.

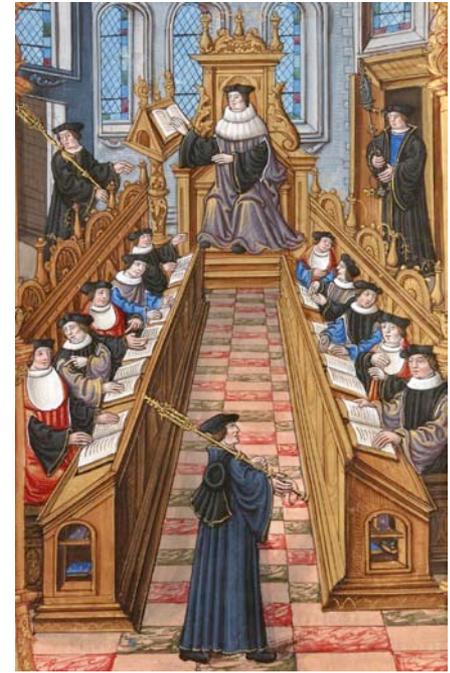
Practical skills:

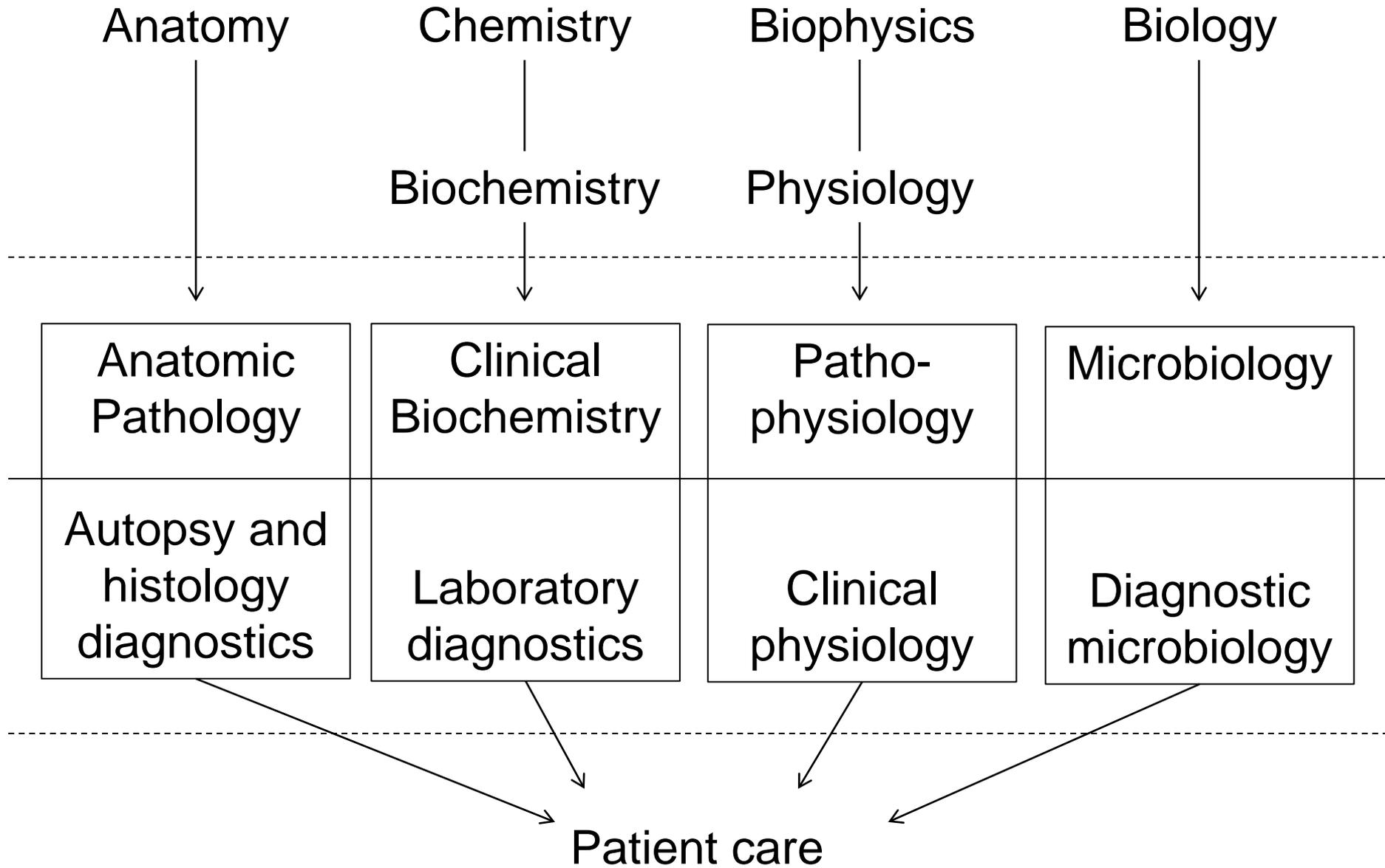
To execute and evaluate clinical biochemical and hematological assays.

Setting up diagnosis and differential diagnosis based on laboratory data.

Attitude:

Avoidance of laboratory polypragmasia.





(Courtesy of Prof. J. Kappelmayer)

Topics of clinical biochemistry course in Debrecen

	Lecture	Practical
General pathology and case studies	5	3
Inflammation and inherited metabolic diseases	6	1
Oncology	4	-
Hematology	7	4
Transfusiology	4	2
Haemostasis	6	4
Kidney	4	1
Sodium and water metabolism	5	1
Disorders of carbohydrate metabolism	4	1
Circulation, Heart	2	1
Disorders of lipid metabolism – uric acid	4	1
Gastrointestinal tract	3	1
Liver pancreas	5	1
Endocrinology, gonads	9	1
Bone, Muscle	2	-
TDM - pharmacogenetics	4	-

75

22

Medical training: clinical biochemistry and/or laboratory medicine



University	Mandatory course?	Lectures	Practicals/Seminars
Budapest	yes	21	0
Debrecen	yes	75	22
Pécs	yes	14	14
Szeged	elective (30%)	28	0

POSTGRADUATE EDUCATION, RECOGNITION: MD AND PHARMACIST



- MEDICAL SCHOOL: 6 Y, PHARMACY: 5 Y
- RESIDENCY TRAINING IN LABORATORY MEDICINE (POLYVALENT): 5 Y
- NATIONAL RESIDENCY PROGRAM
- ONLY UNIVERSITY (AND DEDICATED TEACHING HOSPITAL) LABORATORIES PARTICIPATE IN TRAINING
- NATIONAL BOARD EXAMINATION
- SECONDARY SPECIALIZATION: LABORATORY IMMUNOLOGY-HEMATOLOGY, MOLECULAR DIAGNOSTICS
- POINT OF DISPUTE: MONOVALENT MICROBIOLOGY AS PRIMARY SPECIALIZATION.
- LICENCE: FULL (LABDIRECTOR AFTER 5-10 Y OF PRACTICE)

MEDICAL LABORATORY DIAGNOSTICS

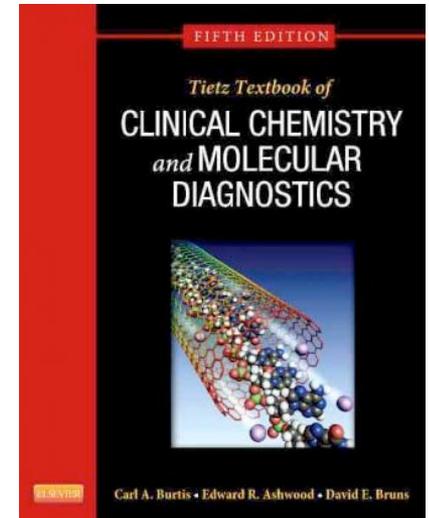
(5 years polyvalent specialization for MDs)

Core program (24 month)

emergency medicine, 6 month
theoretical core course, 1 month
molecular biopathology, 5 month
clinical chemistry, 6 month
microbiology 6, month

Practice (36 month)

hematology, hemostaseology, 6 month
microbiology, 6 month
immunology, 4 month
scientific training, 12 month
elective specialization, 6 month
transfusion medicine, 2 month

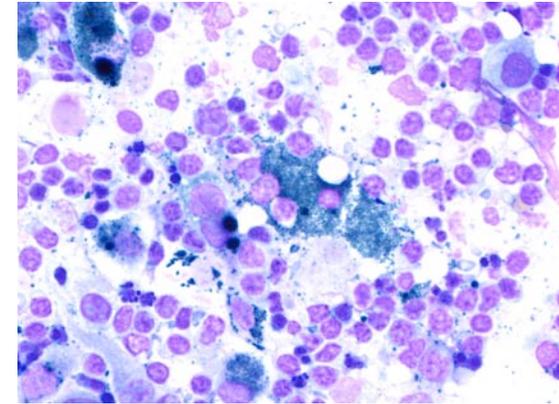


LABORATORY HEMATOLOGY AND IMMUNOLOGY

(FOR MDs ALREADY SPECIALIZED IN MEDICAL LABORATORY DIAGNOSTICS)

Program (24 month)

theoretical course, 1 month
hematology, hemostaseology, 9 month
hematology ambulance, 1 month
immunology, 9 month
immunology ambulance, 1 month
transfusion practice, 3 month



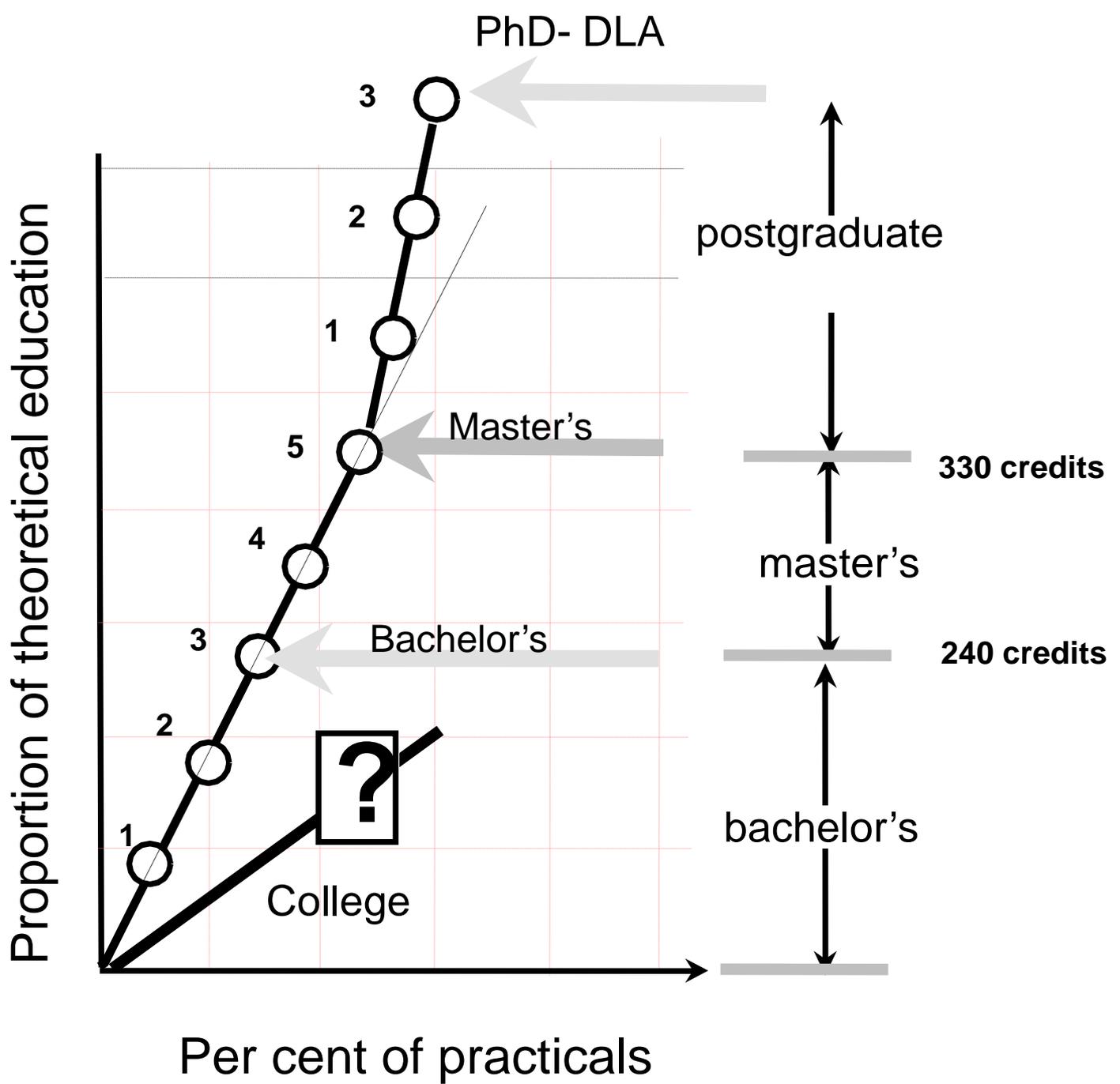
MOLECULAR GENETIC DIAGNOSTICS

(FOR MDs ALREADY SPECIALIZED IN MEDICAL LABORATORY DIAGNOSTICS)

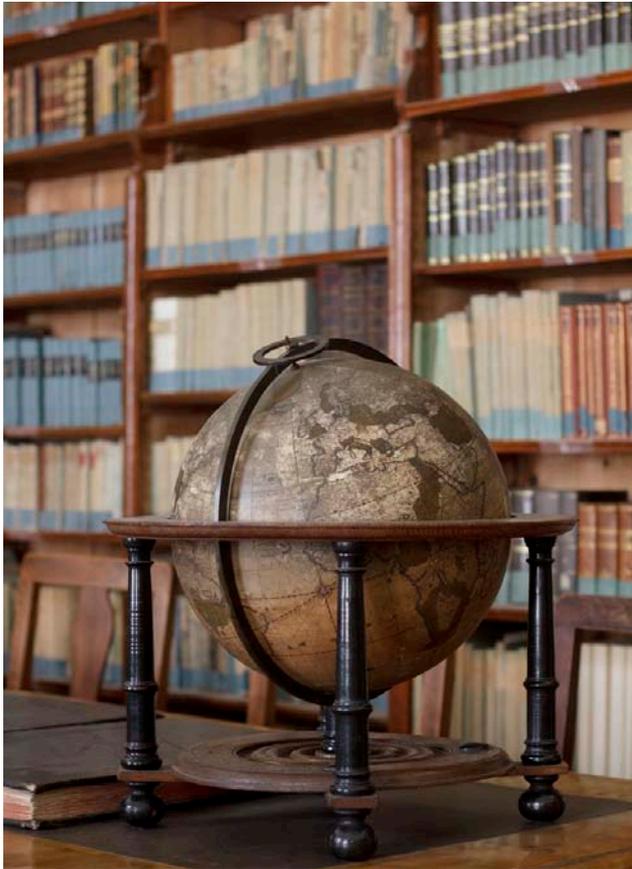
Program (24 month)

concealing in clinical genetics, 6 month
cytogenetics, 6 month
diagnosis of inherited diseases, 3 month
diagnosis of polymorphisms, 3 month
bioinformatics, 4 month
ethics, law, 2 month





UNDERGRADUATE TRAINING: NATURAL SCIENCE



- BIOLOGY
- CHEMISTRY
- BSc 6 semester
- MSc 4 semester
- NO GRADUATE TRAINING ON LABORATORY MEDICINE

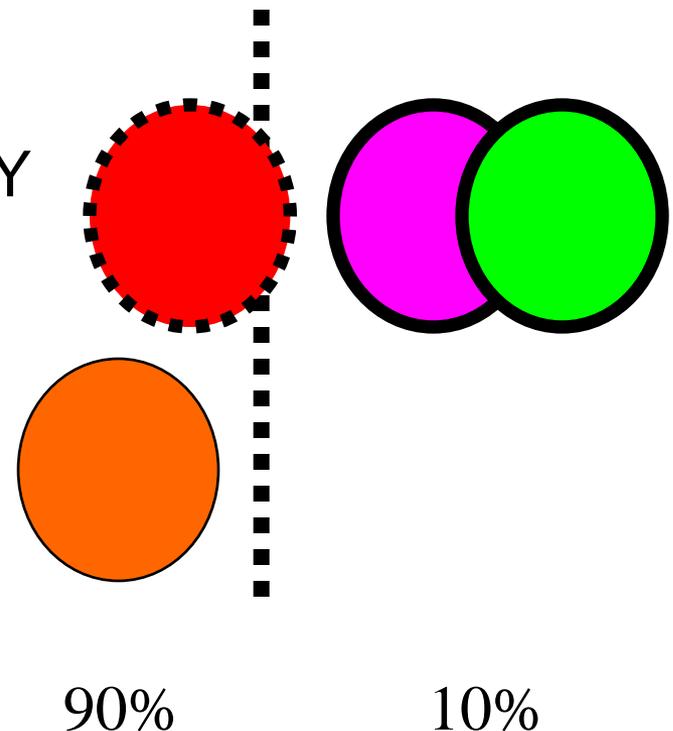
UNDERGRADUATE EDUCATION: CLINICAL LABORATORY SCIENTISTS, ANALYSTS, TECHNOLOGISTS

HIGHER LEVEL (ANALYST, CLINICAL LABORATORY SCIENTIST):

- BSc UNIVERSITY PROGRAM: 4 Y
- MSc UNIVERSITY PROGRAM: 1.5 Y

LOWER LEVEL (TECHNOLOGIST):

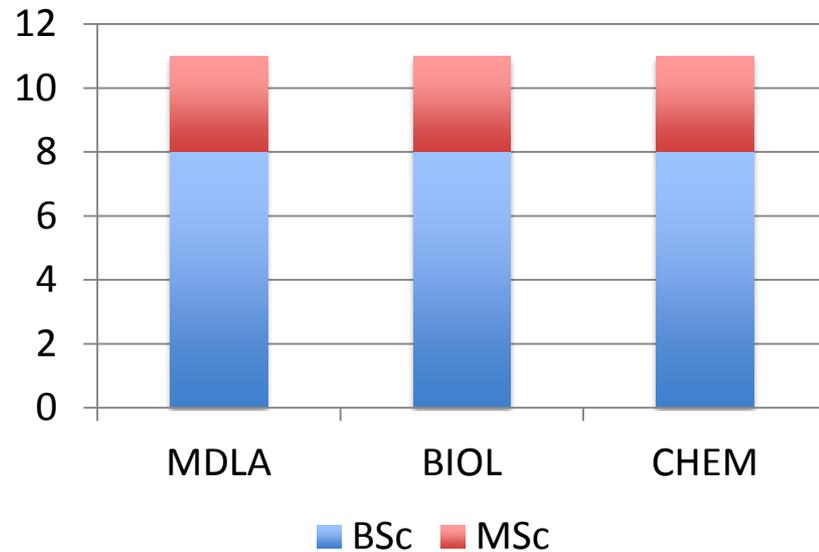
- 3 Y TRAINING
- A BRIDGE TO THE HIGHER (BSc)
LEVEL: EXISTS



CLINICAL LABORATORY SCIENTIST

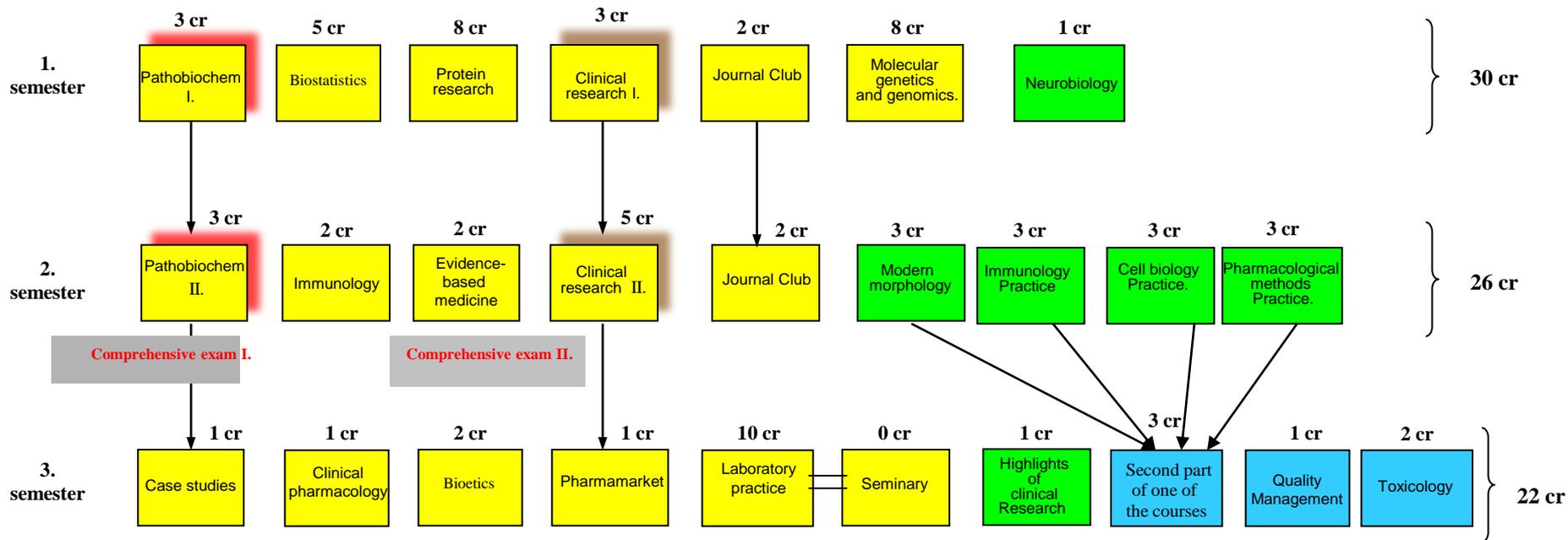
BSc: medical diagnostic
laboratory analyst
(MDLA), 8 semesters

MSc: clinical laboratory scientist
(CLS), 3 semesters



Clinical Laboratory Scientist MSc

- Mandatory courses
- Elective courses
- Optional courses
- Comprehensive exam course



Thesis : 12 cr

Sum : 90 cr

- Comprehensive exam I. : Pathobiochem I – II.
- Comprehensive exam II. : Clinical research I – II.

POSTGRADUATE EDUCATION, RECOGNITION: CHEMIST, BIOLOGIST, CLINICAL LABORATORY SCIENTIST

- UNIVERSITY: 5 Y
- POSTGRADUATE TRAINING:
 - 2004: SPECIALIZATION NOT RECOGNIZED
 - 2014: SPECIALIZATION GOVERNMENTALLY RECOGNIZED (CLINICAL BIOCHEMIST)
- SECONDARY SPECIALIZATION:
 - 2004: NOT POSSIBLE
 - 2014: POSSIBLE
- LICENCE:
 - 2004: PARTIAL OR NONE (CAN NOT BECOME LABDIRECTOR)
 - 2014: FULL (CAN BECOME LABDIRECTOR)

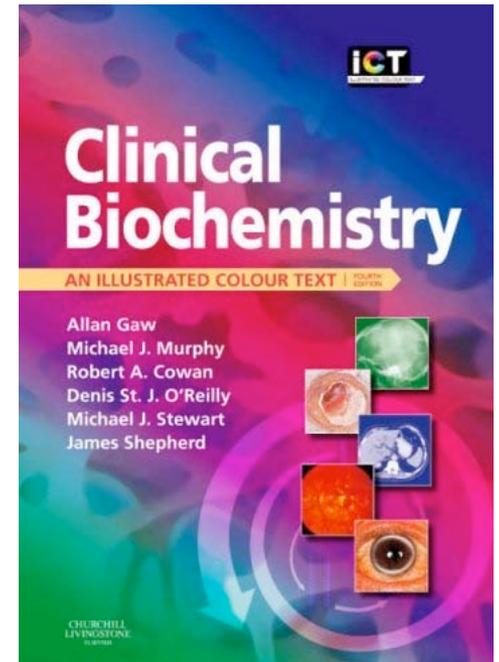


CLINICAL BIOCHEMISTRY

(4 YEARS SPECIALIST TRAINING FOR CHEMISTS, BIOLOGIST,
CLINICAL LABORATORY SCIENTISTS)

Program (48 month)

theoretical core course, 3 month
clinical biochemistry, 12 month
immunology, 6 month
hematology, hemostaseology, 3 month
molecular genetics, 5 month
TDM, toxicology, 3 month
chromatography, mass-spect, 3 month
scientific training, 9 month
elective specialization, 4 month

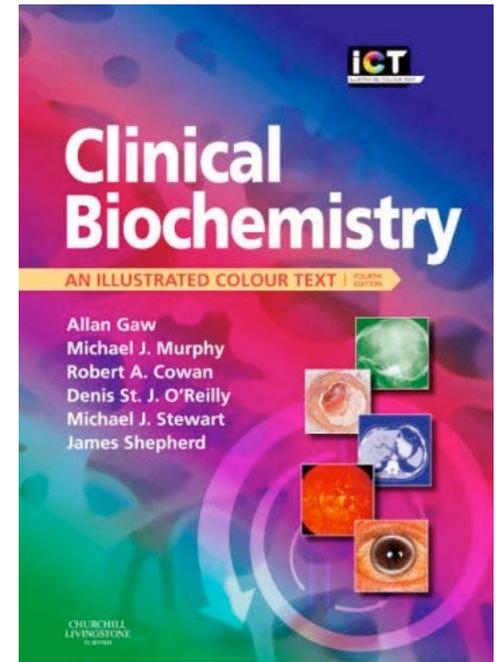


CLINICAL BIOCHEMISTRY

(4 YEARS SPECIALIST TRAINING FOR CHEMISTS, BIOLOGIST,
CLINICAL LABORATORY SCIENTISTS)

EC4's Equivalence of Standards

- Academic and professional training to a minimum of 10 years
- Five years academic training including a Masters or
- Five years academic training including a Masters or equivalent qualification in Medicine, Pharmacy or Science
- ~~Four~~ Five years specialist training concluding in a recognized exit qualification



MOLECULAR BIOLOGY

(SECOND SPECIALIZATION
FOR CHEMISTS, BIOLOGISTS, CLINICAL LABORATORY SCIENTISTS)

Program (24 month)

cytogenetics, 4 month

inherited diseases, 5 month

genetics of malignant diseases, 5 month

polymorphisms, risk factors, 4 month

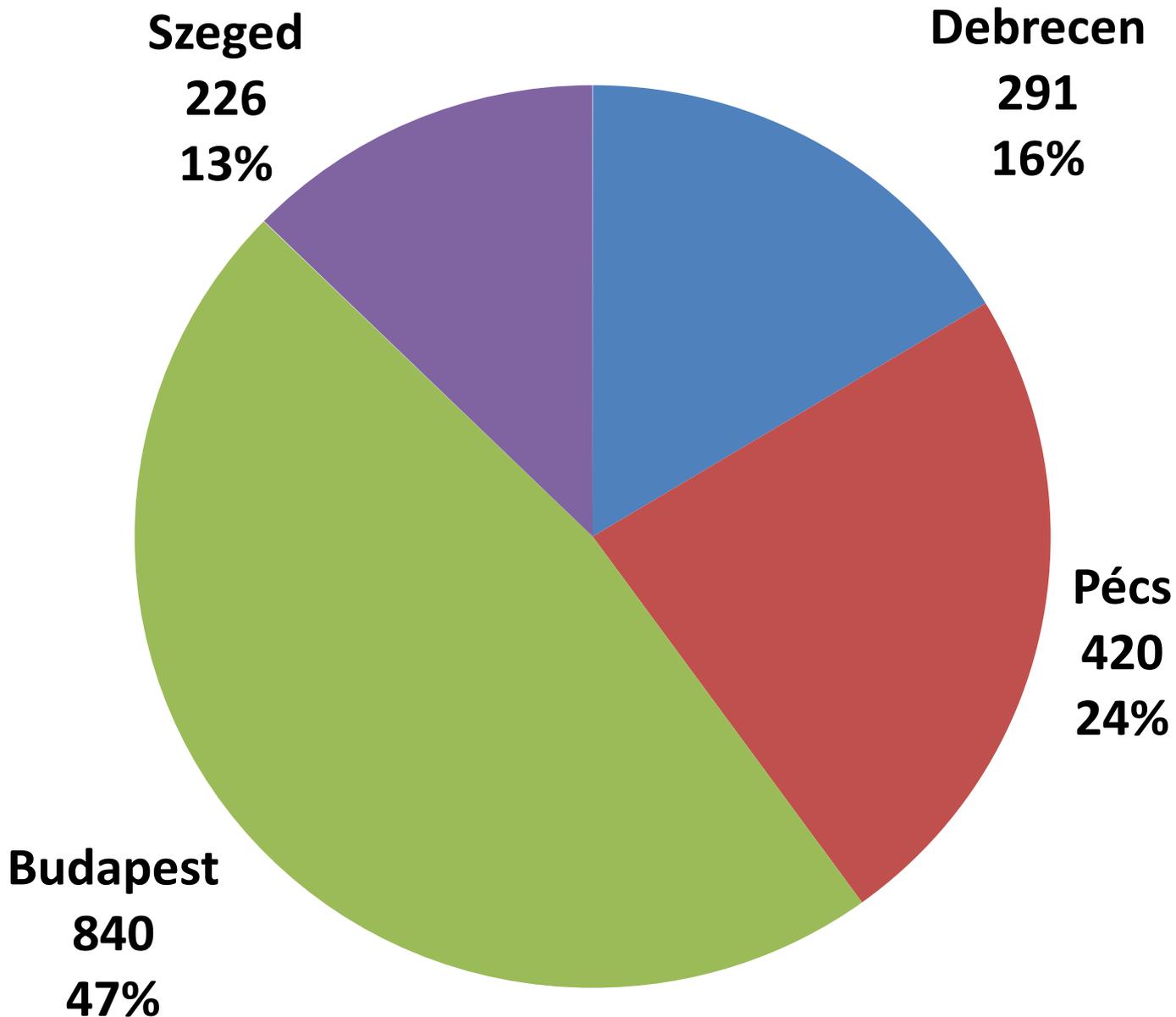
scientific project in genetics, 6 month



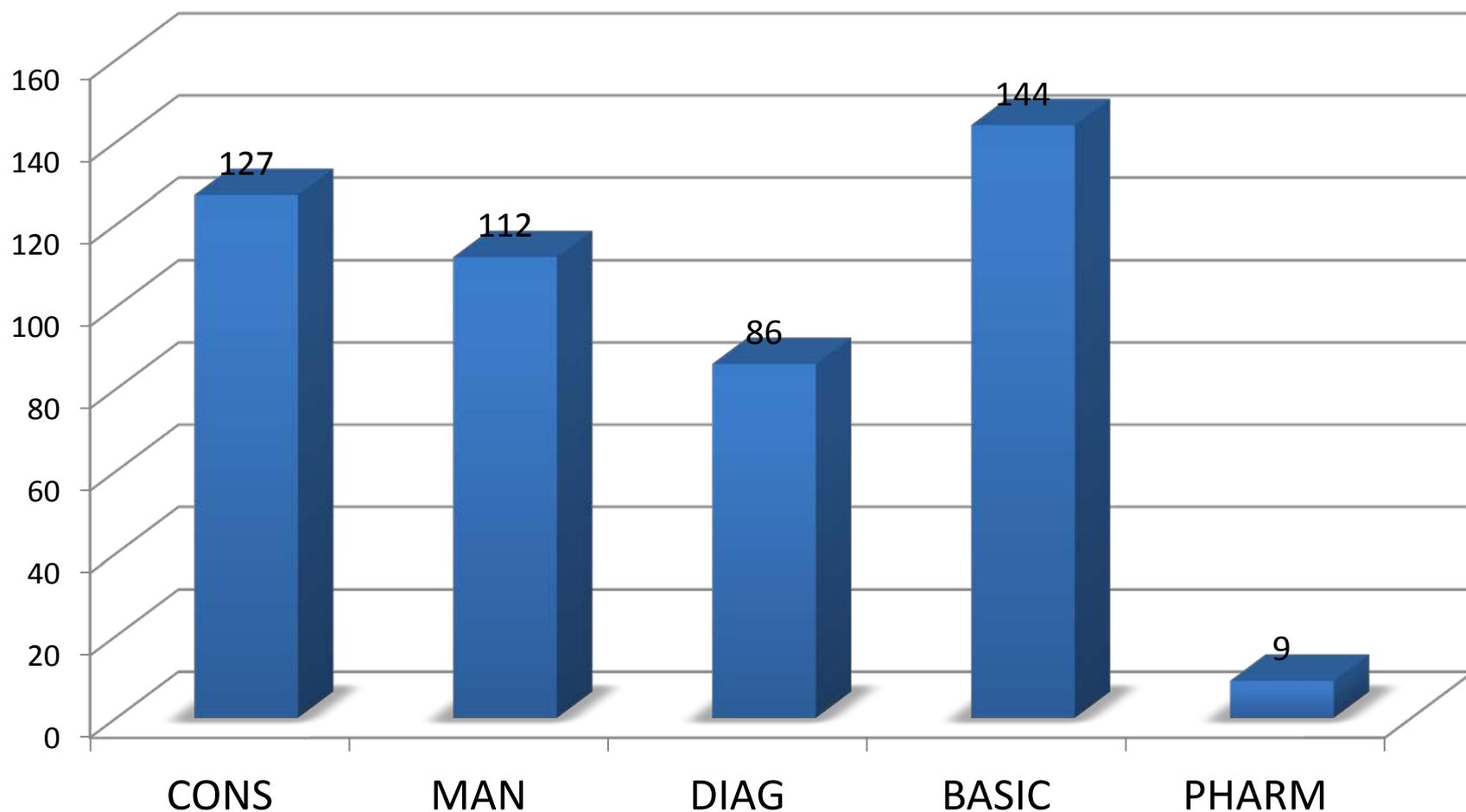
POSTGRADUATE (PhD) EDUCATION



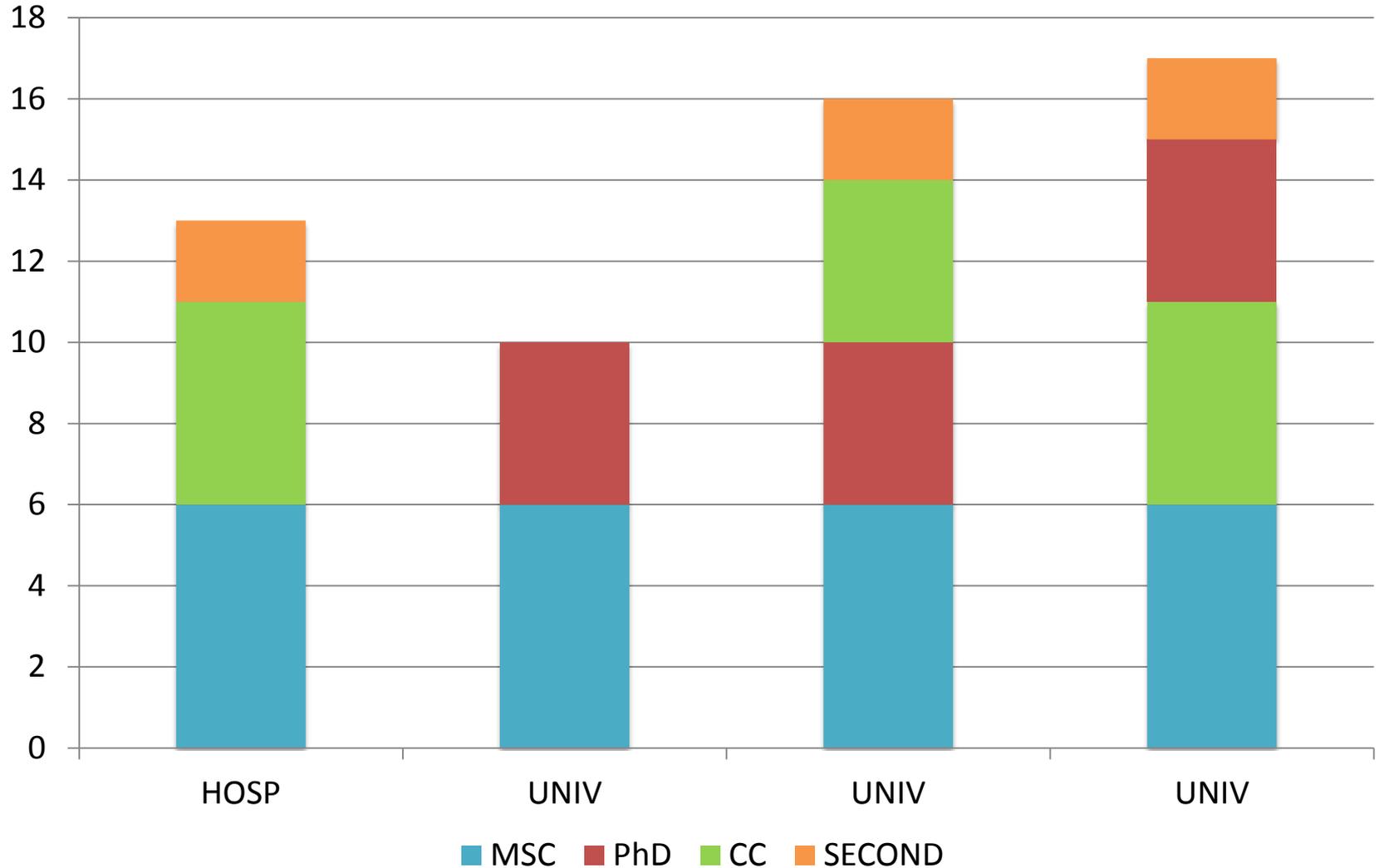
Diagnostic PhD topics 2000-14



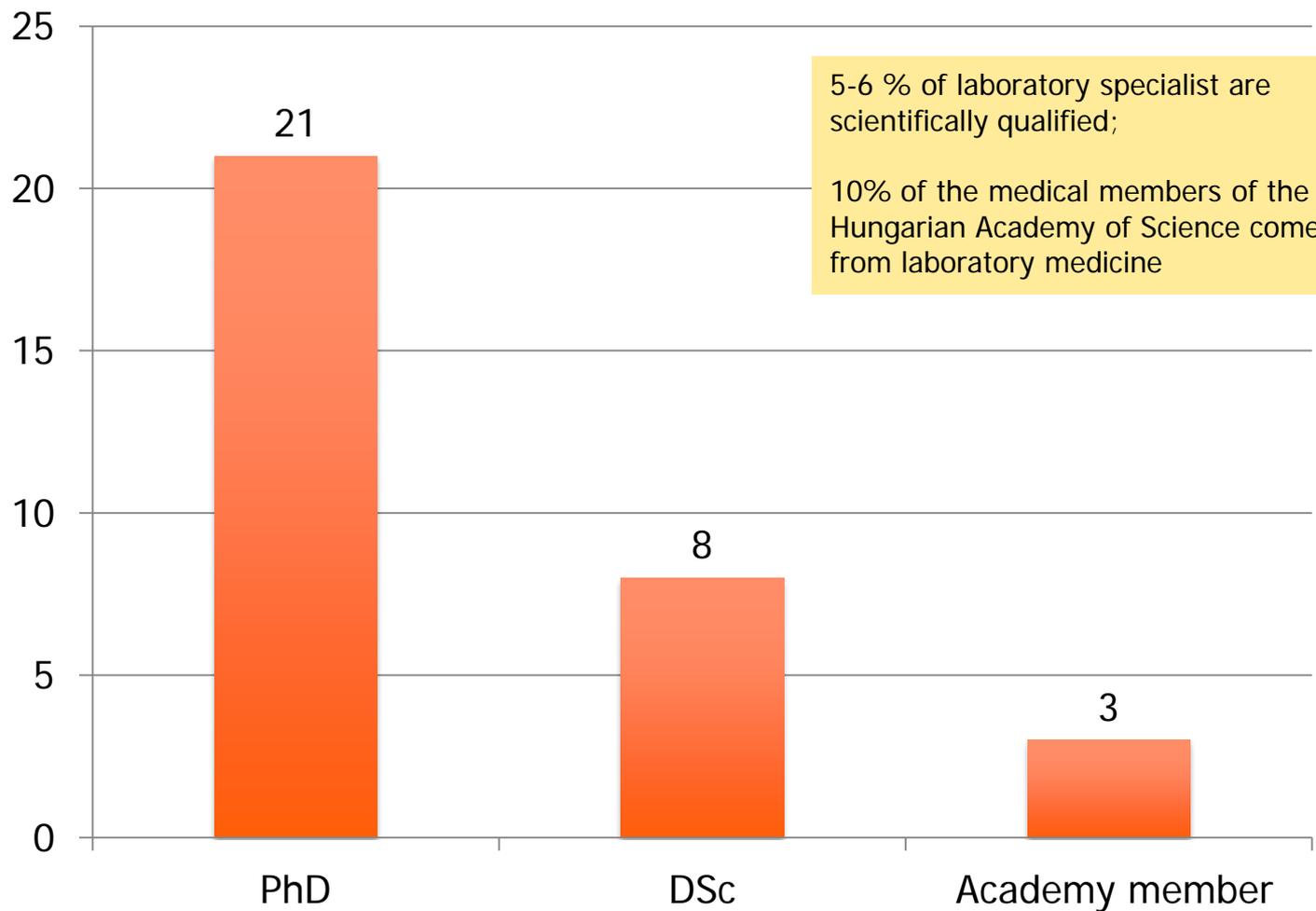
MEDICAL PhD THESIS AT THE UNIVERSITY OF PÉCS (2000-14)



Specialist training + PhD program



SCIENTISTS IN THE HUNGARIAN CLINICAL LABORATORY SERVICE



5-6 % of laboratory specialist are scientifically qualified;

10% of the medical members of the Hungarian Academy of Science come from laboratory medicine



THANKS FOR YOUR ATTENTION!

