

Evaluation of the Research and Professional Activity of the Institutes of the Czech Academy of Sciences (CAS) for the period 2010–2014

Final Report on the Evaluation of the Institute

Name of the Institute: Institute of Microbiology of the CAS, v. v. i.

Fields, in which the Institute registered its teams:

Biochemistry and molecular cell biology, biophysics, virology, ...

Observer representing the Academy Council of the CAS: Karel Aim

Observer representing the Institute: Jiří Gabriel, substitute observer Helena Tlaskalová

Commission No. 6: Biochemistry and molecular cell biology, biophysics, virology

Chair: Professor emeritus Morten Kielland-Brandt

Date of the visit of the Institute: November 9, 2015

Programme of the visit of the Institute: see attached Minutes from the visit

Evaluated research teams:

No. 6 - 122 - Laboratory of Cell Reproduction; No. 7 - 123 - Laboratory of Molecular Genetics of Bacteria; No. 8 - 124 - Laboratory of Cell Biology; No. 9 - 125 - Laboratory of Molecular Biology of Bacterial Pathogens; No. 10 - 126 - Laboratory of Bioinformatics; No. 11 - 127 - Laboratory of Cell Signalization; No. 12 - 128 - Laboratory of Regulation of Gene Expression; No. 16 - 144 - Laboratory of Functional Cytology; No. 20 - 154 - Laboratory of Molecular Biology and Immunology

A. Evaluation of the Institute as a whole

1. Introduction

Institute of Microbiology is a large institute with 24 research laboratories, of which Commission 6 has evaluated 9 (see below), while the others belong more to other fields, e.g. medicine. The basis for our evaluation of the Institute as a whole is the site visit, the reports from the teams, plus the report from the Institute, most of which, unfortunately, only became available to the Commission during and after the visit.

Activities range broadly within microbiology, which is positive for an institute this size. In terms of organisms and biological communities, they range from bacteria to models of primitive multicellularity in yeast. Activities include mechanistic aspects of many cellular processes, and also bioinformatics and clinically relevant work. Our evaluations below of the teams that we were selected to evaluate indicate them as good, most are very good, some excellent.

2. Strengths and Opportunities

The dynamic structure of this institute, in which laboratories are closed or merged, and new are formed, indicates a will and efficiency, both of the director and the board of the institute, to be proactive in maintaining and increasing quality of the teams. Only in a few cases did we come across unexpected organisational structures that were explained by historical reasons.

3. Weaknesses and Threats

Some of the teams have difficulties in attracting strong students and strong young scientists in a global market. Part of the reasons are relatively low salary levels.

4. Recommendations

Maintain, and if possible even strengthen, the very good monitoring of team leader quality, without destroying possibilities for high-risk-high-benefit projects through short-sighted or automatic motivation procedures.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

Publication activity and quality are good as indicated by Phase I evaluations, even more so when journal IFs are considered, but a bit less so when citation is considered.

Declaration on the involvement of students in research

In general, involvement of students in research is very good, but some teams could prioritize this better than they do.

Declaration on societal relevance

Concerning the basic research at the Institute, it is generally of high quality, with important goals. It is therefore expected to have positive and important societal impact, but some not immediately and not in ways that are easily foreseen. Many other activities, like those concerning degradation of xenobiotics, antimicrobial compounds, and clinically important projects, such as work on bacterial pathogens, are of obvious and more direct societal relevance.

Declaration on the position in the international and national context

In general, the institute has extensive and fruitful international (mostly research) and national (research and teaching) collaboration. Many teams have high visibility.

Declaration on the vitality and sustainability

The dynamic management contributes to good vitality, which, however, would be further improved in some teams if more young students and researchers were attracted. The institute has good long-term sustainability because of its experience in research in a wide range of important fields and its continuous upgrading of research equipment. A good shorter-term sustainability is secured by the quality of output, allowing attraction of grants.

Declaration on the strategy and plans for the future

Activity plan for the new 5-year period at the institute level is sensible and briefly formulated. At least as importantly, the 9 teams that we have evaluated have good future plans, most of them very good.

B. Evaluation of the individual teams

Evaluation of the Team No. 16: 122 - Laboratory of Cellular Reproduction

1. Introduction

This team is headed by Jiří Hašek and works with *Saccharomyces cerevisiae* as a model organism for basic biology of eukaryotic cells. During the evaluation period the team has worked with protein trafficking, primarily in relation to translation factors, stress granules, and the Membrane Compartment of Can1. Future plans relate much to stress granules and heat stress.

2. Strengths and Opportunities

An important strength is the experience and skill in the use of model organism genetics for answering important and fundamental questions in cell biology. A related important strength is the technical skills in specialized combinations of protein analysis, microscopy, and gene fusion with tags encoding domains allowing fluorescence detection. These strengths give good opportunities for international collaboration. These opportunities have been used fruitfully, and the team collaborates with laboratories with very high profiles in other countries. A third, also related, important strength is the international visibility achieved through, e.g., successful efforts in organisation of past and future large international conferences and editorial work.

3. Weaknesses and Threats

No obvious weaknesses or threats.

4. Recommendations

Maintaining the strong international visibility, the team should prioritize having primary roles in its collaborations. The Commission finds the current research fundamentally important and the plans sensible. We find it very probable although not certain that the team with these plans can strengthen its share in its publication impact.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The quality profile from Phase I, the citation profile, and the journal impact of the publications are very good.

Declaration on the involvement of students in research

The ratio of PhD students/researchers is good (0.67 by the end of the period), and there has been supervision activity and thesis defences at all three student levels during the period.

Declaration on societal relevance

Fundamental questions are addressed in an expedient way in this research. It is therefore expected to have positive and important societal impact, but not immediately and not in ways that are easily foreseen.

Declaration on the position in the international and national context

The team has a strong international network and a very well recognized position therein.

Declaration on the vitality and sustainability

The team mentions difficulties and efforts in obtaining funding. With the outputs achieved and the sensible plans we expect the applications to be successful, giving a consolidated future.

Declaration on the strategy and plans for the future

The plans for the future are sensible and good, albeit not very detailed; we have no suggestions for changes.

Evaluation of the Team No. 7: 123 - Laboratory of Molecular Genetics of Bacteria

1. Introduction

The team, headed by Miroslav Pátek, comprises about 8 researchers and is involved in regulatory mechanisms of transcription in Gram-positive bacteria, biodegradation, bioremediation and biotransformations, in antibacterial activities of novel compounds and in restriction-modification systems of Type I.

2. Strengths and Opportunities

There are several very interesting results, as e.g. development of the *in vitro* transcription system for *Corynebacterium glutamicum*, structure description of RNA polymerase of *Bacillus subtilis* and mycobacteria, research on biodegradation of various compounds with potential of practical applications (e.g. herbicides), investigation of antimicrobial compounds, etc. Libor Krasny gave an excellent presentation based on very interesting results.

3. Weaknesses and Threats

Some research subjects are not documented by publications, whereas others, such as studies of *B. subtilis* RNA polymerase, have an excellent reputation. The inhibitory effect of lipophosphonoxins is modest, perhaps limiting usefulness. There are no obvious threats.

4. Recommendations

The researchers should do more to pursue practical applications, at least for the topic solved by the accepted patent. Inhibitory concentrations of lipophosphonoxins need to be optimized.

5. Detailed evaluations

Regulatory mechanisms are investigated with *Corynebacterium glutamicum*, which is used in biotechnology mainly as a producer of glutamate. The investigations were performed particularly on housekeeping genes and enabled to engineer valine producing strains. Purified RNA polymerase and purified sigma factors were reconstituted and used for specific promoters. Simultaneous expression of RNA polymerase and sigma factors on two different plasmids enabled to specify promoters to different sigma factors.

The *Bacillus subtilis* RNA polymerase studies (3D structure of the delta subunit, 3' rDNA analysis, interacting proteins and small RNAs) are highly significant and published in well acknowledged journals.

Organisms and their genes responsible for the degradation of nitriles and xenobiotics were identified. Furthermore, a method for the detection of pollutions was described.

Lipophosphonoxins were tested for their antibacterial properties, and Ag was used to increase the antimicrobial activity of hydroxyapatite. The lipophosphonoxins had inhibitory concentrations in the μM range for Gram-positive bacteria and less inhibitory effects on human cell lines. An international patent resulted from this work.

Declaration on the quality of the results and share in their acquisition

The number of original papers in IF-journals was 37. There are also 4 chapters in scientific books and 3 contributions in proceedings. The declared 2 patents are, in fact, Czech and English versions of one topic. The RNA polymerase studies are internationally visible and published in well acknowledged journals, whereas the international response with respect to other subjects is at moderate level.

Declaration on the involvement of students in research

The pedagogical activity and the participation of students in the research of the evaluated team are very high. Three team members act as supervisors of PhD students, the others as supervisors of bachelor and master students.

Declaration on societal relevance

No activities in science popularization and societal contacts are mentioned.

Declaration on the position in the international and national context

The team position is at the national level high, at international level moderate.

Declaration on the vitality and sustainability

Half of the researchers are in the age between 30 and 35, and thus the vitality and sustainability is from this point of view high.

Declaration on the strategy and plans for the future

The research plan of the team for 2015–2019 is very ambitious and diverse and at the same time useful as a basis for short-term planning.

Evaluation of the Team No. 8: 124 - Laboratory of Cell Biology

1. Introduction

This team, headed by Libuše Váchová, is internationally well known for its pioneering and world-leading work with yeast colony morphology and the distinct patterns of cell differentiation as a function of position in the colony. This work takes place in a strongly integrated collaboration with the “Yeast colony group” headed by Zdena Palková at the Faculty of Science, Charles University.

2. Strengths and Opportunities

The team is very strong, as evidenced by international visibility and by outputs. We found that 49 of the refereed articles in the evaluation period had (a) member(s) of the present team as the first and/or last author, places in author lists that by convention in the field indicate primary contribution in terms of work, design, ideas or discoveries. This is impressive, albeit considering that Zdena Palková is here counted as being part of the team because of her part-time affiliation with it. It appears that the team will have ample funding for staying strong. The future prospect of moving to the same site as the “Yeast colony group” and efficiently sharing advanced instrument with that group further add to great future opportunities. Zdena Palkova gave an excellent presentation based on very interesting results.

3. Weaknesses and Threats

The major part of the work has a strong virtue of potentially providing simple and valuable models for multicellularity and cancer. There is a risk that the value of these models will not be as large as hoped for; it is simply impossible to know at present. We praise the team for taking the risk; we think it is worth taking. We also note that the team has a sound and risk-reducing strategy of i) having early plans for testing the model potentials and ii) including related work with other goals (2.2 through 2.4 of the report).

4. Recommendations

The group should be supported. We recommend the team to maintain its strategies; the future plans are detailed and very well thought out.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The quality profile from Phase I, the citation profile, and the journal impact of the publications are all very good. In addition and in particular, we are impressed that 49 of the refereed articles in the evaluation period had (a) member(s) of the present team as the first and/or last author, places in author lists that by convention in the field indicate primary contribution in terms of work, design, ideas or discoveries.

Declaration on the involvement of students in research

There is a good number of students and theses at all levels. However, given the great science, the team should consider contributing even more to education by having even more students.

Declaration on societal relevance

In subsection 2.4 of the report, results of applied research are described, which appear to

have potential or realized immediate practical value, although they have not created income for CAS at present. Fundamental questions are addressed in an expedient way in the basic research described in the other subsections. It is therefore expected to have positive and important societal impact, but not immediately and not in ways that are easily foreseen.

Declaration on the position in the international and national context

Together with the “Yeast colony group” at Charles University, the team has a world-leading position within the field of yeast colony morphology and the related distinct patterns of cell differentiation. The team is internationally highly recognized among yeast biologists.

Declaration on the vitality and sustainability

The team appears extraordinarily robust in terms of ability to maintain and enhance skills and to attract talent and funds.

Declaration on the strategy and plans for the future

The team has a sound and risk-reducing strategy of i) having early plans for testing model potentials and ii) including related work with other goals (2.2 through 2.4 of the report). The future plans are detailed and very well thought out.

Evaluation of the Team No. 9: 125 - Laboratory of Molecular Biology of Bacterial Pathogens

1. Introduction

The team, headed by Peter Šebo, is composed of five small sub-teams directed by senior researchers, together investigating the molecular basis of action of bacterial virulence factors, with emphasis on adenylate cyclase toxin structure and mechanisms of action. The team is internationally well known and highly productive, with some outstanding publications in highly recognized journals. Due to the broad research topics covered, the lab has been solicited for training of doctoral students as revealed by the large number of PhD students supervised and theses defended by team members during the evaluation period.

2. Strengths and Opportunities

The team is very strong, as evidenced by international visibility and by excellent scientific results published in highly impacted journals. The focus on research subjects is very strong, and management is excellent. The majority of the outputs in the evaluation period have a member of this team as first and/or last author, indicating primary contribution in terms of work, design, ideas or discoveries. One patent was filed. Some of the results obtained by the team are being explored by a pharmaceutical company as contract research on development of novel pertussis vaccines

3. Weaknesses and Threats

No weaknesses or threats are obvious.

4. Recommendations

We recommend the team to maintain its strategies. The future plans are detailed and fit the team mission, taking advantage of the synergies of the individual researchers.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The quality profile from Phase I, the citation profile, and the journal impact of the publications are all very good. The results reported have significant impact on the disclosure of molecular mechanisms of adenylate cyclase toxin (ACT) from *Bordetella pertussis*.

Declaration on the involvement of students in research

The team supervises a good number of bachelor and PhD students and currently involves several postdoctoral fellows. Thirteen theses from all three levels were defended during the period. The head of the team, Prof. Peter Šebo, participates in teaching in a few

university courses.

Declaration on societal relevance

The group leader is an active member of several committees, councils and panels and has been involved in outreach to the general public. The future activities are expected to have positive and important societal impact,

Declaration on the position in the international and national context

The team is internationally highly recognized. In the national context, students from all levels are attracted by the research. Outreach towards the general public was performed as lectures, opinion articles and interviews on internet, radio and television.

Declaration on the vitality and sustainability

The team is strong in terms of attracting funding. The very good quality of this research should enable the PIs to successfully apply for grants that will form the necessary basis for their future activities.

Declaration on the strategy and plans for the future

Future research will explore the molecular mechanisms responsible for virulence factors of the whooping cough agent, *Bordetella pertussis*, and the construction and development of a next generation of pertussis vaccines. At the same time as being ambitious, the research strategy is well conceived and takes advantage of the synergies of the individual senior researchers and of international collaborations, thus promising successful outcomes.

Evaluation of the Team No. 10: 126 - Laboratory of Bioinformatics

1. Introduction

The Laboratory of Bioinformatics, headed by Jiří Vohradský, works mostly on two major topics, computational modelling of cell regulatory systems and analysis of specific RNA sequences. The team is very small; most of the papers are written by the head of the Laboratory.

2. Strengths and Opportunities

The quality scientific output of the Laboratory by journal ranking is very good, with median IF of the publications above the average for the field of Biochemistry and Molecular Biology.

The age structure of the Laboratory is adequate.

The research program of the Laboratory is realistic.

The Laboratory has national and international collaborations.

The Laboratory is involved in the large European infrastructures ELIXIR and ISBE.

The Laboratory is a valuable resource for the Institute in terms of bioinformatics expertise, abilities and help for other groups.

3. Weaknesses and Threats

The number of students involved in the research is relatively low.

4. Recommendations

The laboratory will be a valuable resource in terms of bioinformatics expertise, abilities and help for other groups. The Laboratory should have more teaching activity. This way the Laboratory could attract more young scientists. The Team should consider choices of topics to include some with potential for higher citation rate.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The scientific output by journal ranking is very good, with median IF of the publications above the average for the field of Biochemistry and Molecular Biology.

Declaration on the involvement of students in research

The number of students involved in the research work is relatively low. This may be due to the relatively small size of the group.

Declaration on societal relevance

The pedagogical activity of the team is limited. No activity in area of research popularization is listed.

Declaration on the strategy and plans for the future

The Laboratory has a very realistic research plan for 2015-2019.

Declaration on the position in the international and national context:

The research is well acknowledged and has an excellent international reputation.

Evaluation of the Team No. 11: 127 - Laboratory of Cell Signalization

1. Introduction

This team – headed by Pavel Branny and focusing on unravelling signal transduction mechanisms in prokaryotes and eukaryotes – is relatively large and at the same time young in its composition: 10/16 members are below 30/40 years, and only 6 members are older than 45 (out them 2 are above 60). In fact, the Laboratory is composed of two (three) closely associated but in principle independent research groups: The one (headed by Dr. Branny) is dealing with prokaryotes and focuses on signal transduction mechanisms, with particular attention to bacterial Ser/Thr protein kinases of the type first found in eukaryotes; the other group (headed by Tomáš Vomastek, effective in administrative terms from 2016) is working on eukaryotic systems and focuses on the role the ERK (Extracellular signal Regulated Kinase) cascades and their role in the regulation of cellular programs, including cell growth and division, cell death, cell differentiation and cell movement. In addition, Jaroslav Weiser's research group works with a proteomics approach on molecular signaling in Streptococci. The association appears rather loose, as indicated by the fact that joint publications are scarce (we found one coauthored by Drs. Branny, the founder of the Laboratory, and Weiser, and none with Dr. Vomastek). This is unusual but appears to work well – and an association of this kind, especially if it is not imposed on the participating groups for administrative reasons, might well be mutually advantageous – for forming a real group of scientists with basically the same interest but complementary expertise, also sharing instruments and facilities.

The association proves to be justified by productivity of the Laboratory, which is good with international standards.

2. Strengths and Opportunities

A major strength of the group is in their joint forces. The topic is of high interest with numerous possible applications – thus offering good opportunities on this important research field. Tomáš Vomastek gave an excellent presentation based on very interesting results. The eukaryotic system has a very good perspective.

3. Weaknesses and Threats

No obvious weaknesses or threats.

4. Recommendations

The group should be supported.

5. Detailed evaluations

Quality of the results and share in their acquisition

When based on the present number of team members, the productivity of this group is good but not outstanding (27 papers + 1 chapter), with 1 out of 7 and 1 out of 2 papers in the first decile/quartile in journal and citation ranking, respectively, and – as deduced from the text

and reference list - with significant contributions by the group members. When based on the institutional FTE values, however, productivity and quality are very good.

Involvement of students in research

In the past 5 years, 3 BSc, 12 MSc and 4 PhD theses were defended.

Societal relevance

Dr. Branny has a board membership at the Charles University; no other data are given.

Position in the international and national context

The position of the group is of good standard both on the national and international levels.

Vitality and sustainability

The individual subgroups, and even more the team, have high vitality and sustainability.

Strategy and plans for the future

The strategy is well defined for each group. For prokaryotes (i) determination of 3-D structures of the sensor domain of a Ser/Thr protein kinase (StkP) and the binding domain of LocZ, (ii) molecular interactions of LocZ with other elements of the cell division machinery and (iii) identification of other substrates of StkP. For the eukaryotes, the plan is to focus on (i) the role ERK in the disruption of epithelial phenotypes and gain of a mesenchymal migratory phenotype and (ii) role of the actin cytoskeleton in the regulation of nuclear movement and directional migration.

Evaluation of the Team No. 12: 128 - Laboratory of Regulation of Gene Expression

1. Introduction

This team, headed by Leoš Válašek, is very young, yet very strong. It works on structure, function and interactions of translation initiation factors and their subunits with each other and with other parts of the translation machinery. The detailed structural work and the findings of initiation factor involvement in elongation and read-through-versus-stop decisions are noteworthy.

2. Strengths and Opportunities

It is noteworthy that a group this young and this small works successfully with analogous questions in yeast and mammalian systems. We see this as a sign of courage and strength, and it certainly offers opportunities. The Team has a good international network and generally has a leading role in its relation with partners. They have 16 publications in international journals with (a) team member(s) as first and/or last author, places in author lists that by convention in the field indicate primary contribution in terms of work, design, ideas or discoveries. The publication record is of very high quality. The presentation for the Commission was excellent and based on impressive results.

3. Weaknesses and Threats

Considering the high scientific level of the Team, we have noted the lack of outreach to the general public or memberships of scientific councils, etc., although somewhat expected from a group this young.

4. Recommendations

We recommend that team members participate in outreach to the general public and participate more in activities in the scientific community, so as to enhance visibility of its great research to persons outside the field. We note that the number of PhD students decreased in 2014, and recommend to bring it back to the more favourable numbers the group had during most of the evaluation period.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The quality profile from Phase I, the citation profile, and the journal impact of the publications are all very good. In addition, we are impressed that 16 of the refereed articles in the evaluation period had (a) member(s) of the present team as the first and/or last author, places in author lists that by convention in the field indicate primary contribution in terms of work, design, ideas or discoveries.

Declaration on the involvement of students in research

There has been strong involvement of students at all levels through the evaluation period.

Declaration on societal relevance

Fundamental questions are addressed in an efficient way in this basic research. It is therefore expected to have positive and important societal impact, but not immediately and not in ways that are easily foreseen.

Declaration on the position in the international and national context

The team has a good international network, and the team generally has a leading role in its relation with partners. National visibility would be increased by outreach activities to the general public and activities in the scientific community.

Declaration on the vitality and sustainability

Because of its great science and good productivity, the team should have no difficulties obtaining funding sufficient for a good and continuous activity level.

Declaration on the strategy and plans for the future

The future plans are very well thought out and formulated.

Evaluation of the Team No. 16: 144 - Laboratory of Functional Cytology

1. Introduction

This is a small team formed by two senior researchers, one post-doc, two PhD students and one technician; the team leader is Pavla Binarová. Research focuses on molecular biology of the cytoskeleton, addressing in particular gamma-tubulin functions and interactions using plant cells as a model. The Team participates in a few collaborative national and international projects that provide complementary approaches that support ongoing and future research. Future plans aim at continuing long-term research on gamma tubulin and its functions in acentrosomal microtubule nucleation and cell division.

2. Strengths and Opportunities

An important strength is the specific skill of researchers and students in the use of cell biology techniques (molecular biology, protein purification, proteomics), attracting trainees and new collaborators. These strengths give good opportunities for international collaborations and for raising funding.

3. Weaknesses and Threats

The number of outputs during the period is rather low (9), but the team members yielded primary contributions. The number of students at all levels is low. Research is funded mainly by collaborative projects.

4. Recommendations

Maintaining the international collaborations, the team should increase efforts in obtaining own grants. The current research is fundamentally important and could be supplemented with projects aiming at more practical outcomes, thus attracting funding. We recommend the number of PhD students increased.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

The quality profile from Phase I, the citation profile, and the journal impact of the

publications are good. The number of outputs during the period is rather low (9); however, most of the evaluated outputs have a group member as first or last author, indicating primary contribution to the work.

Declaration on the involvement of students in research

The number of PhD students is low (2) but they were involved in research as demonstrated by their co-authorship in several outputs. Students were trained in advanced techniques of cell biology, thus acquiring specific valuable skills. There has been supervision activity and thesis defences during the period.

Declaration on societal relevance

The group leader participated in evaluator panels and in one editorial board. No outreach to the general public was reported.

Declaration on the position in the international and national context

The team has international and national collaborations providing complementary approaches that support ongoing and future research.

Declaration on the strategy and plans for the future

The team will continue investigating gamma tubulin and its functions in acentrosomal microtubule nucleation and cell division. The plans for the future are sound and detailed and are based on ongoing collaborations.

Evaluation of the Team No. 20: 154 - Laboratory of Molecular Biology and Immunology

1. Introduction

This laboratory, headed by Veronika Benson, officially split out of the Laboratory of Innate Immunity in 2014. In order to transform, the laboratory has over the past five years undergone a major change regarding research interests, as well as personnel restructuring. Recently, it consists of a fairly young team that needs time to show professional success, especially in the field of therapeutic biosensors.

2. Strengths and Opportunities

The activity on biosensors is promising, in applications with clinical teams.

3. Weaknesses and Threats

The immunology activity would benefit from some good international collaboration and exchanges; this could help the team to test the research goals and bring the results into new perspectives.

4. Recommendations

One year is a short time for evaluation; the young team needs time to be given opportunity to demonstrate professional success. We recommend an internal review in 2 years time.

5. Detailed evaluations

Declaration on the quality of the results and share in their acquisition

Main outputs of the team are in immunology, and in the publications of new technologies. The outputs in the field of therapeutic biosensors have a good position internationally. Some outputs in the immunological field are in the Journal of Immunology, which has a high standard; others are in less well known journals.

Declaration on the involvement of students in research

Three MSc students and three students for doctoral theses in exciting fields, numbers quite high for such a small group.

Declaration on societal relevance

International collaboration has enabled the Team to gain expertise with evaluation of nanodiamonds as biosensors, for diagnostic and therapeutic use in cancer; there is some technology transfer.

Declaration on the position in the international and national context

Within a consortium of the European project, DINAMO (7FP EU), important ties were established with other professionals in the field of nanomaterials.

Declaration on the strategy and plans for the future

The team will focus on the development of nanodiamond-based diagnostic and therapeutic sensors, as well as on the characterization of new immunotherapeutics. The team will work on proof-of-principle of biosensors for therapeutic applications.

Date: February 15, 2016

Commission Chair: Professor emeritus Morten Kielland-Brandt