ANNUAL REPORT ON ACTIVITIES AND MANAGEMENT FOR 2022

Institute of Molecular Genetics of the Czech Academy of Sciences

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Discussed by the Supervisory Board of the Institute on: May 18th, 2023

Approved by the Institute Council on: 2nd date

Prague, March 31st, 2023

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1) ORGANIZATIONAL STRUCTURE
2) AUDIT REPORT, WHICH INCLUDES THE FINANCIAL STATEMENTS
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1. INFORMATION ON THE COMPOSITION OF THE BODIES OF THE PUBLIC RESEARCH INSTITUTION AND THEIR ACTIVITIES OR CHANGES

1.1 INITIAL COMPOSITION OF THE INSTITUTE BODIES

Director of the Institute: Petr Dráber, DSc

1.1.1 INSTITUTE COUNCIL (AS OF JANUARY 1ST, 2022)

Chairman: Jiří Hejnar, PhD
Vice-Chairman: Assoc Prof David Staněk, PhD

Internal members:
Meritxell Alberich Jordà, PhD
Petr Bartůněk, PhD.
Martin Gregor, PhD
Vladimír Kořínek, PhD
Zbyněk Kozmik, PhD
Prof Petr Svoboda, PhD

External members:
Miroslava Anděrová, PhD (Institute of Experimental Medicine of the CAS)
Prof Jan Černý, PhD (Faculty of Science, Charles University)
Assoc Prof Libor Krásný, PhD (Institute of Microbiology of the CAS)
Prof Karel Smetana, MD, DSc (First Faculty of Medicine, Charles University)

1.1.2 SUPERVISORY BOARD (AS OF JANUARY 1ST, 2022)

Chairman: Zdeněk Havlas, DSc (CAS)
Vice-Chairman: Prof Václav Hořejší, PhD (Institute of Molecular Genetics of the CAS (hereinafter referred to as IMG))
Members:
Jiří Hašek, PhD (Institute of Microbiology of the CAS)
Ján Matejka, JD, PhD (Institute of State and Law of the CAS)
Assoc Prof Jana Pěknicová, PhD (Institute of Biotechnology of the CAS)

1.2 CHANGES IN THE COMPOSITION OF THE INSTITUTE COUNCIL AND THE SUPERVISORY BOARD DURING THE YEAR 2022

In 2022, due to the expiration of the term of office of one internal member and resignation of one internal member, two new members of the Institute Council were elected. Effective from May 24th, 2022, the following new members were elected:

Libor Macůrek, MD, PhD
Ondřej Štěpánek, PhD

In 2022, the following changes were made to the composition of the Supervisory Board due to expiring terms of office.
Ondrej Horváth, MD – Vice-Chairman – effective from May 1st, 2022
Assoc Prof Jiří Gabriel, DSc – effective from June 21st, 2022
Ján Matejka, JD, PhD – second term of office effective from October 5th, 2022

1.3 INFORMATION ON THE ACTIVITIES OF IMG BODIES

1.3.1 DIRECTOR

The activities of the Director were governed by Act No. 341/2005 Coll. and the Statutes of the CAS. The main task was to ensure conditions for implementation of the programme of research activities and research projects, preparation of internal regulations, budget and all documents necessary for the operation of the Institute, their submission, discussion and/or approval, depending on the nature of the documents, to the Council of the IMG (see Council of the Institute), the Supervisory Board of the IMG (see Supervisory Board), the Committee of the Trade Union (Collective Contract, jubilees, etc.) and to the superior bodies. The Director was present at the Institute throughout 2022 (except for a few regular holidays) and devoted himself fully to ensuring the tasks arising from his position. He regularly reported to the IMG Council and to the heads of the scientific groups on the current developments at the Institute, He was significantly involved in activities related to the BIOCEV project (he was a member of the BIOCEV Centre Council) and the operation of the Krč Campus (he was the chairman of the Krč Campus Council) and contributed significantly to ensuring the smooth operation of four large national infrastructures hosted at the Institute of Molecular Genetics (Czech Centre for Phenogenomics, CZ-OPENSCREEN, CZECH BIOIMAGING) or at the Institute of Organic Chemistry and Biochemistry of the CAS (ELIXIR CZ).

At the beginning of the year, he was significantly involved in ensuring the Institute operation during the COVID-19 pandemic, including the shift of some activities at the turn of 2021/2022 to the period after the end of the winter wave of the pandemic.

He contributed to successful continuation of the renovation of the building for production of genetically modified poultry at the detached site in Koleč, which was inaugurated in the presence of the President of the CAS on April 22nd, *2022.

Illustration: *Opening ceremony of the renovated building for production of genetically modified poultry at the detached site in Koleč.*

He contributed to the start of renovation works for handling infectious material in animal models at the laboratories in the building of IMG in BIOCEV; i.e., work in the safety level 3 (BSL3) mode. He also contributed to the construction of a new seminar room in the basement of the main building in Krč, to reconstruction of the damaged roof of the main building and to repair of the damaged sewerage system of the animal facilities in Krč.

To manage the Institute and raise its scientific level, he used regular Director's meetings with the participation of his appointed representatives and heads of administrative and technical departments of IMG, held even during the pandemic period at fortnightly intervals. Minutes of these meetings have been recorded.

In 2022, research at the IMG was carried out in 26 research and research service groups (21 in Krč and 5 in Vestec within the BIOCEV project) and in four national infrastructures (3 in Krč and 1 in Vestec). As in the previous years, the Director, together with the administrative team, was involved in the publication activities of the groups and, together with the IMG Council, carried out the selection and rewarding of the best publications for the previous year. The rewards for the best publications were paid for the second time in 2022 from the estate of Prof. J. Říman according to the newly developed statute of the IMG Director's Award for new fundamental scientific findings obtained in scientific research activities.

He participated in the evaluation and utilization of eleven core facilities of IMG, located in Krč, Vestec and Koleč. Supporting activities were provided by the Administration and Technical Services, consisting

of the Economy and IT Departments, Building Management, and Administrative Team. Within the Administrative Team, there was a Grants Group, which worked with the researchers in obtaining grant funds, systematically monitored the sources of specific funds, assisted with preparation of grant applications and with inspections from the grant agencies. In 2022, the Institute was involved in 96 grant projects from various funders, including the Czech Science Foundation (40 projects), the Ministry of Education (16), the EU (9), the Ministry of Health (14) and others. On average, each research group works approximately on four research projects. Within the framework of the membership in the Council of the Institute of Molecular Genetics for Commercialization, he focused on the possibilities of commercial application of selected outputs of the Institute; these were mainly new hybridoma lines producing antibodies, production of genetically modified mice and poultry. Within the framework of cooperation with the company Smart Brain, s.r.o., he focused on the possibilities of commercial use of patented substance Liocore as a drug.

The further direction of the Institute was the focus of a meeting of the heads of research, service and administrative departments at the Liblice Castle, where attention was focused on current issues, including addressing the impact of the energy crisis on energy-intensive IMG units, especially animal facilities, services, and large national infrastructures. Attention was also paid to PhD student recruitment and publication activities. Due to the negative impact of the increase in energy prices, we have had to resort to a number of cost-saving measures which include reducing heating temperatures, banning the use of direct-fired heaters, turning off humidification, curtailing the use of air-conditioning, limiting the operation of office and laboratory space at the turn of the year, etc.

Due to the pandemic, the all-Institute Conference and the all-Institute Assembly, followed by the Institute party, were moved from the winter months to a two-day activity on May 26th and 27th. The The all-Institute Assembly included activities celebrating the 60th anniversary of the Institute. Moving these activities from the winter months to the spring months was an interesting change that will probably be reflected in future years.

Illustration: *All-Institute Assembly on May 26th, 2022 during the celebration of the 60th anniversary of the Institute of Molecular Genetics; the lecture on the history of IMG was given by Václav Pačes.*

Illustration: *Meeting at the celebration of the 60th IMG anniversary on May 26th, 2022. From left to right: former director Václav Hořejší, long-time secretary of all three directors in the picture Leona Krausová, former IMG director and former Chairman of the Academy of Sciences of the Czech Republic Václav Pačes and current IMG director Petr Dráber.*

1.3.2 INSTITUTE COUNCIL

In 2022, there were a total of five meetings and six per rollam votes. Each meeting included a regular detailed report by the Director on the developments at the Institute, which was then discussed by the Council members. In addition, the Council continually commented on grant application proposals submitted by the IMG researchers, draft collaborative agreements and memoranda.

OTHER ITEMS DISCUSSED DURING INDIVIDUAL MEETINGS AND VOTES

- **1st meeting on February 22nd, 2022**
  1) Discussion of the results of the selection committee for the selection procedure for the position of Director of the Institute of Molecular Genetics for the term 2022-2027
  2) Voting on the proposal of the President of the CAS to appoint the Director of the Institute of Molecular Genetics
  3) Miscellaneous
     a) Personnel dispute Sedlák-Bartůněk in the CZ-Openscreen infrastructure
- **2nd meeting on March 31st, 2022**
  1) Discussion of the Institute draft budget for 2022
  2) Competition for the IMG Director's Award 2021
  3) Personnel changes in CZ-OPENSCREEN
  4) Announcement of the selection procedure for new group leaders
- **3rd meeting on June 23rd, 2022**
  1) Election of the Chairman and Vice-Chairman of the Council
  2) Voting on the Annual Report on the Activities and Management of IMG for 2021
  3) Discussion of the Medium-Term Budget Outlook of IMG for the period 2021 - 2024
  4) Discussion of the Memorandum of Understanding with the Yucatán Centre for Scientific Research
  5) Miscellaneous
     a) Establishment of a selection committee for new group leaders
- **4th meeting on September 15th, 2022**
  1) Selection process for new group leaders
  2) Miscellaneous
     a) Laboratory records and their storage
- **5th meeting on December 12th, 2022**
  1) Selection procedure for new group leaders
  2) Move of Lukáš Čermák's laboratory to the Krč building

3) Framework for the recruitment of group leaders funded by OP JAK or similar programmes
4) Update of the Rules of Procedure of the IMG Council
5) Miscellaneous
   a) Principle of co-funding of OP JAK projects
   b) Discussion of an amendment to the collaborative agreement between the Institute of Molecular Genetics and the Technische Universität Dresden

- **per rollam vote completed on January 12th, 2022**
  Per rollam vote on the composition of the selection committee for the election of the Director of the Institute of Molecular Genetics.

- **per rollam vote completed on March 31st, 2022**
  Per rollam voting for the IMG Director's Award for the best publication in 2021.

- **per rollam vote completed on April 22nd, 2022**
  Voting on candidates for postdoctoral salary support.

- **per rollam vote completed on September 19th,2022**
  Voting on candidates for postdoctoral salary support.

- **per rollam vote completed on October 17th, 2022**
  Voting on the update of the Organizational Rules of the Institute of Molecular Genetics (Ř/08/2019) - 4th edition.

- **per rollam vote completed on December 19th, 2022**
  Voting on updating the Rules of Procedure of the IMG Council (Ř/04/2022).

1.3.3 SUPERVISORY BOARD

In 2022, there were two regular meetings of the Supervisory Board of the Institute of Molecular Genetics and seven meetings held per rollam. Both regular meetings included a detailed report by the Director on the developments at the Institute, which was then discussed by the members of the Supervisory Board. At its meetings, the Supervisory Board commented on the following matters:

- **meeting and per rollam vote No. 1/2022 completed on March 7th, 2022**
  Discussion and granting of a prior written consent to the conclusion of the Contract on the future agreement on the establishment of an easement and agreement on the location of the construction No. IZ-12-6002140/VB-02 between the IMG (the future obligated party) and ČEZ Distribuce, a.s., represented by BREMA, spol. s r.o. (the future entitled party) on the basis of its written power of attorney No. PM-151/2021.

  The estimated extent of the restriction of the affected properties by the easement is: the HV cable line laid in the land plot No. 197/99 in length = 95 LM.

- **1st meeting on June 10th, 2022**

1) Approval of the agenda.
2) Report of the Director of the Institute on the current status of the Institute and on the ideas and plans for the future.
3) Approval of the minutes of the meeting held on 30/11/2021.
4) Approval of a resolution for a per rollam vote for the period December 8th, 2021 - March 7th, 2022.
5) Approval of the draft budget for 2022 and the medium-term outlook 2021-2024.
6) Discussion of the Annual Report on the activities and management of the Institute of Molecular Genetics, including the audit of the financial statements for the period from 1 January 1st to December 31st, 2021.
   In view of the auditor's unqualified opinion, the SB did not require the auditor's personal presence for the discussion. The SB had no comments on the financial statements for the period from January 1st to December 31st, 2021 in view of the report and the independent auditor's opinion. The SB unanimously approved the draft report.
   Approval of the transfer of the profit of CZK 12,661,469.94 to the reserve fund and CZK 1,000,000 to the social fund. Additional approval of the transfer of CZK 0.45 from the 2020 profit to the reserve fund.
7) Approval of the SB activity report for 2021.
8) Taking note of the overview of legal actions in the disposal of property valued at over 50 thousand CZK for the period January 1st - June 8th, 2022.
9) Discussion of reports of legal entities in which the IMG participates.
10) Discussion of the report of the IMG on the results of public audits for the year 2021.
11) Information on the change in the composition of the Supervisory Board of the Institute.
12) Discussion of the evaluation of the managerial skills of the IMG Director.

- **meeting and per rollam vote No. 2/2022 closed on August 2nd, 2022**
  Discussion of the financial audit report of Infrafrontier GmbH for the year 2021.

- **meeting and per rollam vote No. 3/2022 closed on August 26th, 2022**
  Discussion and granting of prior written consent:

  1) to conclude the Amendment No. 4 to the Pledge Agreement concluded on March 19th, 2018 between the IMG (as Proprietary Party) and PJ Gastro Group s.r.o. (as Tenant).
  By this amendment, the text of Article VII, paragraph 1, fifth indent is changed so that the current wording "The Tenant undertakes that the price of at least one main meal shall not exceed CZK 85 and soup CZK 20" is deleted and replaced by the new wording "The Tenant undertakes that the price of at least one main meal shall not exceed CZK 100 and soup CZK 28".

  2) to conclude the Implementing Agreement to the Framework Agreement for the acquisition of Microsoft software products based on Enterprise Microsoft licensing programs between the IMG (as the customer) and SoftwareONE Czech Republic s.r.o. (as the supplier).

The price for the provision of performance by the supplier under this implementation contract is CZK 15,193,022.73 excluding VAT for 36 months.

- **meeting and per rollam vote No. 4/2022 closed on September 20th, 2022**
  Discussion and appointment of the auditor for the statutory audit of the Institute of Molecular Genetics of the CAS (hereinafter referred to as the IMG) and appointment of Efekt DC s.r.o., ID No.: 62243292, with registered office at Oldřichovská 14/11, 405 02 Děčín, as the auditor for the statutory audit of the IMG in 2022.

- **2nd meeting on November 25th, 2022**
  1) Approval of the agenda.
  2) Approval of the minutes of the meeting held on June 17th, 2021.
  3) Report of the Director of the IMG.
  4) Getting acquainted with the new Chairman of the IMG Council.
  5) Approval of a resolution for a per rollam vote between August 2nd and September 20th, 2022.
  6) Taking note of the overview of legal actions in the disposal of property valued at more than CZK 50 thousand CZK for the period June 9th - November 8th, 2022.

- **meeting and per rollam vote No. 5/2022 closed on December 8th, 2022**
  Discussion and granting of a prior written consent to the conclusion of a lease agreement for the use of non-residential premises located in the building Fb – animal facility on the land plot No. 390/74 in c.a. Libuš and 804/118 in the cad. Kunratice between the IMG (Lessor) and the Institute of Organic Chemistry and Biochemistry of the CAS (Lessee) for a fixed term from January 1st, 2023 to December 31st, 2023.
  The lease was agreed in the total amount of CZK 240,625.31/year excluding VAT.

- **meeting and per rollam vote No. 6/2022 closed on December 9th, 2022**
  Discussion and granting of prior written consent to the conclusion of Amendment No. 1 to the lease agreement No. 2020-1013 of December 23rd, 2020 between the IMG (Lessor) and JR Tech, a.s. (Lessee).
  The amendment is concluded following the Lessee's request to allow modifications to be made in order to minimise energy costs and in view of the disrepair of the property and the Lessor's obligation to act with due care.
  The parties agree that it is in the interest of both the Lessor and the Lessee that the Lessee shall provide for the construction modifications and renovation of Building D to the following extent:
  - Replacement of all windows and entrance doors
  - Changing the form of heating by replacing the gas boiler with a heat pump
  - Insulation of the ceiling of building D
  - Replacement of lighting in Building D (installation of LED luminaires)

The estimated value of the renovation is CZK 506,294, excluding VAT, with the maximum actual price not exceeding CZK 530,000, excluding VAT.

- **meeting and per rollam vote No. 7/2022 closed on December 28th, 2022**
  Discussion and granting of prior written consent to the conclusion of Amendment No. 1 to the contract for the provision of premises for short-term rentals No. 2021-953 of October 7th, 2021 between the IMG and CZECH-IN s.r.o. This amendment cancels Annex No. 1 to the original contract and replaces it with a new Annex No. 1, which is attached to this amendment.

2. INFORMATION ON CHANGES TO THE FOUNDATION DEED

There were no changes to the Foundation Deed in 2022.

3. EVALUATION OF MAIN ACTIVITIES

3.1 SCIENTIFIC ACTIVITY AND APPLICATION OF ITS RESULTS

3.1.1 ACHIEVED RESULTS

The Institute of Molecular Genetics is one of the main scientific institutions in the Czech Republic, which comprehensively deals with basic research in the field of molecular genetics. The subject of its main activity is defined by its Foundation Deed and includes research in the field of the molecular basis of serious diseases (leukaemia, cancer, AIDS), biology of normal and malignantly transformed cells and immune processes involved in the defence of the organism. Particularly in these key areas, a number of important results were achieved during the period under review (see below). The main outputs of the IMG were scientific publications in international journals. In 2022, a total of 141 publications were published. Of this number, 121 publications were in journals with impact factor (IF). The average IF of journals in which the IMG published in 2022 was 8.494. In total, 65 articles were published in journals with an IF greater than 5 (ranging from 5.000-8.999), 13 articles with an IF ranging from 9.000-14.999, and 16 articles in journals with an IF greater than 15.

3.1.2 THE THREE MOST IMPORTANT RESULTS OF SCIENTIFIC ACTIVITY

1) CMTM4 is a subunit of the IL-17 receptor and is involved in autoimmune pathology

Knizkova D, Pribikova M, Draberova H, Semberova T, Trivic T, Synackova A, Ujevic A, Stefanovic J, Drobek A, Huranova M, Niederlova V, Tsyklauri O, Neuwirth A, Tureckova J, Stepanek O, Draber P: CMTM4 is a subunit of the IL-17 receptor and mediates autoimmune pathology. **Nat Immunol (2022)** 23(11):1644-1652.

We found that the CMTM4 protein is the third subunit of the receptor for pro-inflammatory cytokine IL-17. IL-17 plays an important role in immunity against yeast and bacterial infections, but also triggers pathological immune events such as autoimmune psoriasis. We have shown that CMTM4 is indispensable for IL-17 recognition by cells and for their subsequent pro-inflammatory response. Genetically engineered mice that lacked the CMTM4 protein were significantly protected from developing psoriasis.

Collaborating institution

- First Faculty of Medicine, Charles University

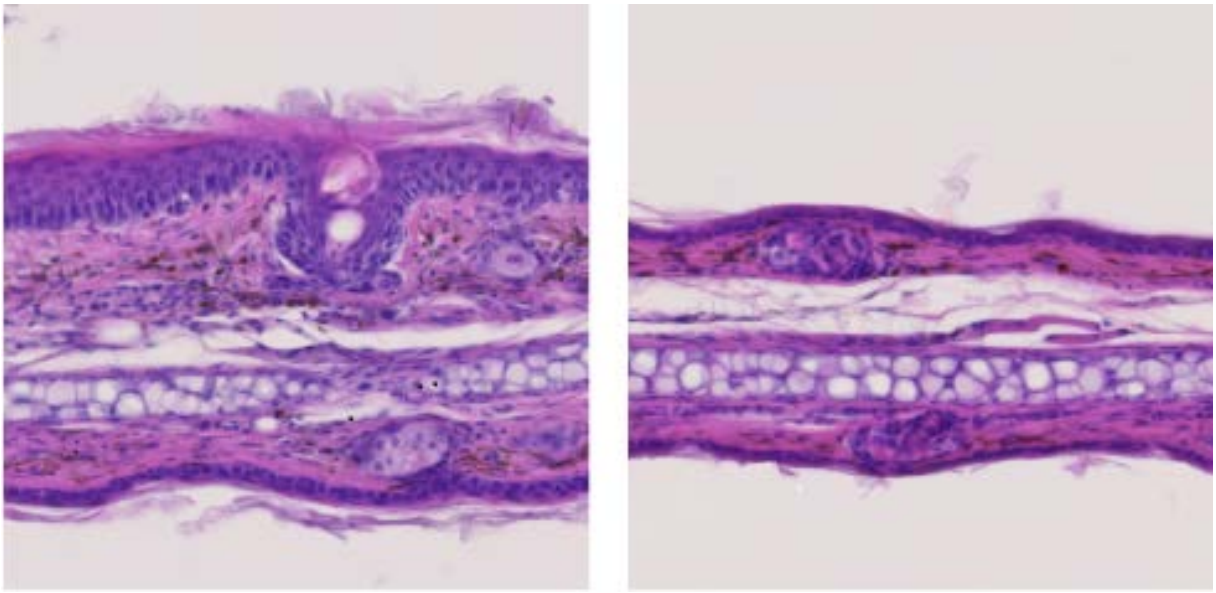

Illustration: Histology of the ear of a psoriatic mouse (left) and a CMTM4-deficient mouse (right) that is resistant to psoriasis

Histological analysis of the ears of laboratory mice suffering from autoimmune psoriasis. This disease is characterized by marked thickening of the skin (left). In contrast, mice lacking CMTM4 are significantly protected from this disease (right).

2) Structural and functional basis of mammalian microRNA biogenesis by Dicer nuclease

Zapletal D, Taborska E, Pasulka J, Malik R, Kubicek K, Zanova M, Much C, Sebesta M, Buccheri V, Horvat F, Jenickova I, Prochazkova M, Prochazka J, Pinkas M, Novacek J, Joseph DF, Sedlacek R, Bernecky C,

O'Carroll D, Stefl R, Svoboda P: Structural and functional basis of mammalian microRNA biogenesis by Dicer. **Mol Cell 2022** 82(21): 4064-4079.e13.

This work explains, on a structural model and in vivo, the unique way in which the mammalian enzyme Dicer selects, binds and splices RNA, and elucidates the long unknown links between the structure of this enzyme and the distinct biological roles of the small RNAs it produces in mammalian cells. It shows that early in vertebrate evolution, this enzyme underwent a major structural adaptation that promotes production of so-called microRNAs, important regulators of gene expression, and inhibits RNA interference, a mechanism of innate immunity.

Collaborating institution

- CEITEC-MUNI

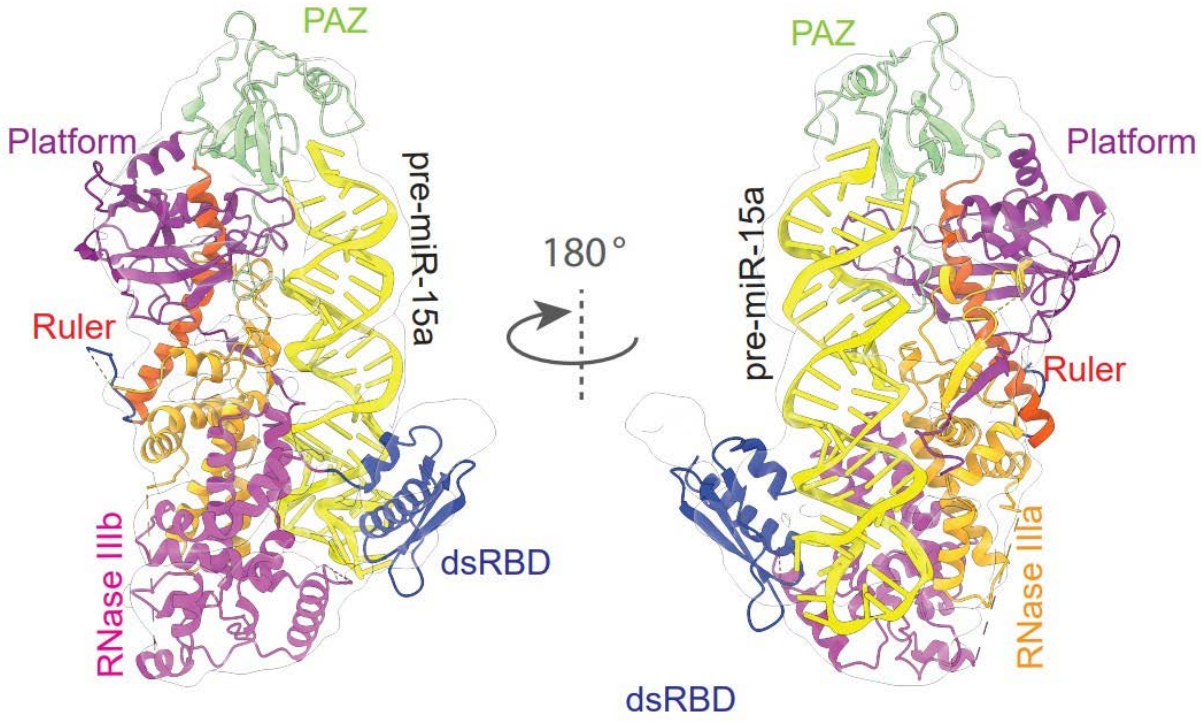

Illustration: Dicer

Reconstruction of the Dicer enzyme structure at the time of substrate cleavage. The microRNA substrate is shown in yellow.

3) BRAT1 links RNA processing integrator complex function to neurodegeneration

Cihlarova Z, Kubovciak J, Sobol M, Krejcikova K, Sachova J, Kolar M, Stanek D, Barinka C, Yoon G, Caldecott KW, Hanzlikova H: BRAT1 links integrator and defective RNA processing with neurodegeneration. **Nat Commun 2022** 13(1): 5026.

Mutations in the BRAT1 protein are associated with neurodevelopmental and neurodegenerative disorders in humans, characterized by diverse manifestations with varying levels of clinical severity. However, the underlying molecular mechanisms of the disease pathology are not well understood. In our study, we have discovered and characterized BRAT1 as a structural and functional component of the Integrator and for the first time linked defects in this critical RNA processing complex to neurodegeneration.

Collaborating institutions

- Faculty of Science, Charles University; IBT CAS; Department of Pediatrics, Division of Clinical and Metabolic Genetics, The Hospital for Sick Children, University of Toronto, Toronto, Canada; Genome Damage and Stability Centre, School of Life Sciences, University of Sussex, Falmer, Brighton, UK;

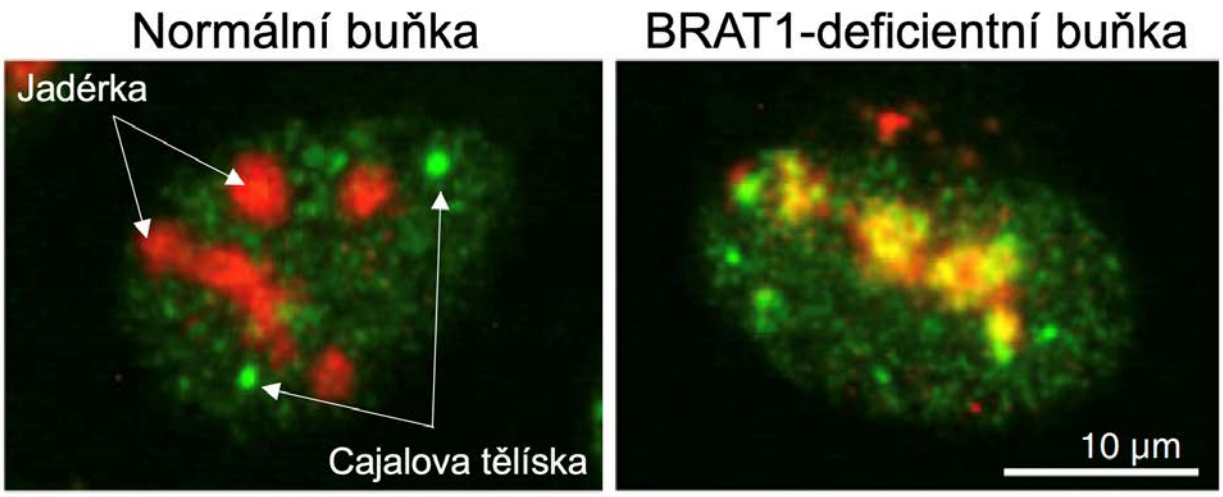

Illustration: detection of RNA processing errors by fluorescent staining

Defects in RNA processing in BRAT1-deficient cells lead to the breakdown of Cajal bodies within the nucleus and subsequent transfer of material to the nucleoli, i.e., pathological localization.

3.1.3 A SELECTION OF OTHER SIGNIFICANT RESULTS

- Larsen BD, Benada J, Yung PYK, Bell RAV, Pappas G, Urban V, Ahlskog JK, Kuo TT, Janscak P, Megeney LA, Elsässer SJ, *Bartek J*, Sørensen CS: Cancer cells use self-inflicted DNA breaks to evade growth limits imposed by genotoxic stress. **Science 2022** *376(6592): 476-483*.

  CAD nuclease is involved in apoptosis. We have demonstrated its novel non-canonical function contributing to radioresistance of tumor cells by inducing DNA damage extending the time to repair radiation damage.
  Collaborators: University of Copenhagen, Danish Cancer Society, Denmark and other collaborating institutions.

- Dobeš J, Ben-Nun O, Binyamin A, Stoler-Barak L, Oftedal BE, Goldfarb Y, Kadouri N, Gruper Y, Givony T, Zalayat I, Kováčová K, Böhmová H, Valter E, Shulman Z, Filipp D, Husebye ES, Abramson J: Extrathymic expression of Aire controls the induction of effective T17 cell-mediated immune response to Candida albicans. **Nat Immunol 2022** 23(7): 1098-1108.

  A key paper that has elucidated the function of transcription factor AIRE outside the thymus, specifically in lymph nodes, where AIRE plays a role in the defense against Candida yeasts.
  Collaborating institution: Weizmann Insitute of Science, Israel.

- Vaitsiankova A, Burdova K, Sobol M, Gautam A, Benada O, Hanzlikova H, Caldecott KW: PARP inhibition impedes the maturation of nascent DNA strands during DNA replication. **Nat Struct Mol Biol 2022** 29(4):329-338.

  We have identified sites on DNA inside cancer cells where anticancer drugs, called PARP inhibitors, are trapped and act. These are used to treat certain cancers, such as breast and prostate cancer.
  Collaborating institution: Genome Damage and Stability Centre, School of Life Sciences, University of Sussex, UK.

- Hadrava Vanova K, Pang Y, Krobova L, Kraus M, Nahacka Z, Boukalova S, Pack SD, Zobalova R, Zhu J, Huynh TT, Jochmanova I, Uher O, Hubackova S, Dvorakova S, Garrett TJ, Ghayee HK, Wu X, Schuster B, Knapp PE, Frysak Z, Hartmann I, Nilubol N, Cerny J, Taieb D, Rohlena J, Neuzil J, Yang C, Pacak K: Germline SUCLG2 Variants in Patients With Pheochromocytoma and Paraganglioma. **J Natl Cancer Inst 2022** 114(1): 130-138.

  We have described eight novel variants of the SUCLG2 gene that are responsible for reduced levels of the SDHB subunit and misassembly of complex II, leading to aberrant respiration and increased succinate accumulation.

- Tumova S, Milacek M, Šnajdr I, Muthu M, Tuma R, Reha D, Jedlicka P, Bittova L, Novotna A, Majer P, Sedlak D, Jindra M: Unique peptidic agonists of a juvenile hormone receptor with species-specific effects on insect development and reproduction. **Proc Natl Acad Sci U S A 2022** 119(48): e2215541119.

  We have prepared and further characterized novel synthetic peptide analogues of juvenile hormone with high potency and selectivity.

- Stavast CJ, van Zuijen I, Karkoulia E, Özçelik A, van Hoven-Beijen A, Leon LG, Voerman JSA, Janssen GMC, van Veelen PA, Burocziova M, Brouwer RWW, van IJcken WFJ, Maas A, Bindels EM, van der Velden VHJ, Schliehe C, Katsikis PD, Alberich-Jorda M, Erkeland SJ: The tumor suppressor MIR139 is silenced by POLR2M to promote AML oncogenesis. **Leukemia 2022** 36(3): 687-700.

  We are investigating the mechanisms of transformation in acute myeloid leukemia.
  Collaborating institution: Erasmus MC, University Medical Center Rotterdam, Department of Cell Biology, Rotterdam, The Netherlands.

- Nievergelt AP, Zykov I, Diener D, Chhatre A, Buchholz TO, Delling M, Diez S, Jug F, Stepanek L, Pigino G: Conversion of anterograde into retrograde trains is an intrinsic property of intraflagellar transport. **Curr Biol 2022** 32(18):4071-4078.e4.

  This is a landmark work that, by combining physical and chemical manipulation, has shown for the first time that the process of particle rotation in intraflagellar transport is a property of the particles and does not require factors specifically localized to the end of the flagellum, as has been assumed in the field.
  Collaborating institution: this is primarily the work of the laboratory of Dr. G. Pigino with the contribution of our employee Dr. Štěpánek (especially from the time of his stay in this laboratory).

- Štefková-Mazochová K, Danda H, Dehaen W, Jurásek B, Šíchová K, Pinterová-Leca N, Mazoch V, Krausová BH, Kysilov B, Smejkalová T, Vyklický L, Kohout M, Hájková K, Svozil D, Horsley RR, Kuchař M, Páleníček T: Pharmacokinetic, pharmacodynamic, and behavioural studies of deschloroketamine in Wistar rats. **Br J Pharmacol 2022** 179(1): 65-83.

  We studied in detail the pharmacokinetic properties of deschloroketamine and its antagonistic activity at NMDA receptors and stimulatory effects on locomotion.

- Boleslavska B, Oravetzova A, Shukla K, Nascakova Z, Ibini ON, Hasanova Z, Andrs M, Kanagaraj R, Dobrovolna J, Janscak P: DDX17 helicase promotes resolution of R-loop-mediated transcription-replication conflicts in human cells. **Nucleic Acids Res 2022** 50(21): 12274-12290.

  R-loops arise when replication and transcription of genes collide and are a frequent cause of genomic instability in cancer cells. This study describes the role of DDX17 helicase in R-loop unwinding, which is essential for re-initiation of DNA replication.

- Grusanovic S, Danek P, Kuzmina M, Adamcova MK, Burocziova M, Mikyskova R, Vanickova K, Kosanovic S, Pokorna J, Reinis M, Brdicka T, Alberich-Jorda M: Chronic inflammation decreases HSC fitness by activating the druggable Jak/Stat3 signaling pathway. **EMBO Rep 2022**, e54729.

  We are investigating the effect of chronic inflammation on the hematopoietic system and blood cell production.

- Prechova M, Adamova Z, Schweizer AL, Maninova M, Bauer A, Kah D, Meier-Menches SM, Wiche G, Fabry B, Gregor M: Plectin-mediated cytoskeletal crosstalk controls cell tension and cohesion in epithelial sheets. **J Cell Biol 2022** 221(3):e202105146.

  Plectin is a structural protein that plays a key role in maintaining the mechanical stability of cells and tissues. This study elucidates the mechanisms by which plectin influences the organization of the cytoskeleton in epithelia and maintains functional intercellular junctions.
  Collaborating institutions:
  1) Department of Quantitative Cell Biology, Institute of Molecular Cell Biology, University of Münster, Münster, Germany;
  2) Department of Physics, University of Erlangen-Nuremberg, Erlangen, Germany;
  3) Department of Analytical Chemistry, University of Vienna, Vienna, Austria;
  4) Department of Biochemistry and Cell Biology, Max Perutz Labs, University of Vienna, Vienna, Austria

- Březina J, Vobořil M, Filipp D: Mechanisms of Direct and Indirect Presentation of Self-Antigens in the Thymus. **Front Immunol 2022** 13: e926625.

  A review article describing the current knowledge of the mechanisms of direct and indirect antigen presentation in the thymus required for thymocyte selection.

- Pavliuchenko N, Duric I, Kralova J, Fabisik M, Spoutil F, Prochazka J, Kasparek P, Pokorna J, Skopcova T, Sedlacek R, Brdicka T: Molecular interactions of adaptor protein PSTPIP2 control neutrophil-mediated responses leading to autoinflammation. **Front Immunol 2022** 13: 1035226.

PSTPIP2 is an adaptor protein that suppresses inflammation. This study shows that it does so through interactions with proteins that inhibit production of pro-inflammatory factors by neutrophil granulocytes.

- Vobořil M, Březina J, Brabec T, Dobeš J, Ballek O, Dobešová M, Manning J, Blumberg RS, Filipp D: A model of preferential pairing between epithelial and dendritic cells in thymic antigen transfer. **Elife 2022** 11: e71578.

  Using mouse models, we have shown that preferential pairing occurs between certain populations of epithelial and dendritic cells of the thymus in antigen transfer.

- Petrusova J, Manning J, Filipp D: AIRE in Male Fertility: A New Hypothesis. Cells 2022 11(19): 3168.

  This paper presents a new thesis on the function of transcription factor AIRE in the control mechanisms of fertility in mammals.

- Petrusová J, Havalda R, Flachs P, Venit T, Darášová A, Hůlková L, Sztacho M, Hozák P: Focal Adhesion Protein Vinculin Is Required for Proper Meiotic Progression during Mouse Spermatogenesis. **Cells 2022** 11(13):2013.

  Focal adhesion protein vinculin localizes to the nuclei in cells that give rise to sperm. The absence of vinculin leads to fewer offspring, and is therefore relevant to male fertility.

- Koncošová M, Rumlová M, Mikyšková R, Reiniš M, Zelenka J, Ruml T, Kirakci K, Lang K: Avenue to X-ray-induced photodynamic therapy of prostatic carcinoma with octahedral molybdenum cluster nanoparticles. **J Mater Chem B 2022** 10(17): 3303-3310.

  The study shows the possibility of application of molybdenum-based radiosensitizers in photodynamic therapy of various tumors in combination with radiotherapy.
  Collaborating institution: University of Chemistry and Technology.

- Paprckova D, Niederlova V, Moudra A, Drobek A, Pribikova M, Janusova S, Schober K, Neuwirth A, Michalik J, Huranova M, Horkova V, Cesnekova M, Simova M, Prochazka J, Balounova J, Busch DH, Sedlacek R, Schwarzer M, Stepanek O: Self-reactivity of CD8 T-cell clones determines their differentiation status rather than their responsiveness in infections. **Front Immunol 2022** 13: 1009198.

  We found that the autoreactivity of T-lymphocytes affects their differentiation, but not their ability to respond to infection.

- Petrzilek J, Pasulka J, Malik R, Horvat F, Kataruka S, Fulka H, Svoboda P: De novo emergence, existence, and demise of a protein-coding gene in murids. **BMC Biol 2022** 20(1): 272.

  Analysis of the origin, evolution and demise of the mouse gene providing a textbook example of the "life cycle" of genes.

- Hason M, Mikulasova T, Machonova O, Pombinho A, van Ham TJ, Irion U, Nüsslein-Volhard C, Bartunek P, Svoboda O: M-CSFR/CSF1R signaling regulates myeloid fates in zebrafish via distinct action of its receptors and ligands. **Blood Adv 2022** 6(5): 1474-1488.

  In this work, we studied the role of CSF1 receptors and their ligands in embryonic development and adulthood by editing the zebrafish genome and analyzing the transcriptome of individual cells.

- Klebanovych A, Vinopal S, Dráberová E, Sládková V, Sulimenko T, Sulimenko V, Vosecká V, Macůrek L, Legido A, Dráber P: C53 Interacting with UFM1-Protein Ligase 1 Regulates Microtubule Nucleation in Response to ER Stress. **Cells 2022** 11(3): 555.

  The mechanisms of microtubule (MT) regulation in cells during endoplasmic reticulum (ER) stress are unknown. This study shows that tumor suppressor C53 modulates centrosomal MT nucleation during the ER stress.
  Collaborating institution: Drexel University College of Medicine, Philadelphia, USA.

- Zhao X, Bartholdy B, Yamamoto Y, Evans EK, Alberich-Jordà M, Staber PB, Benoukraf T, Zhang P, Zhang J, Trinh BQ, Crispino JD, Hoang T, Bassal MA, Tenen DG: PU.1-c-Jun interaction is crucial for PU.1 function in myeloid development. **Commun Biol 2022** 5(1): 961.

  We define the role of PU.1-c-jun interaction in granulocyte differentiation. International collaborators, including scientists from Boston and Singapore, contributed to this work.

- Petrusová J, Manning J, Kubovčiak J, Kolář M, Filipp D: Two complementary approaches for efficient isolation of Sertoli cells for transcriptomic analysis. **Front Cell Dev Biol 2022** 10: 972017.

  Our group has described two new methods to obtain Sertoli cell suspensions for RNA sequencing, a previously problematic topic.

- Lobo de Figueiredo-Pontes L, Adamcova MK, Welner RS, Tenen DG, Alberich-Jorda M: Response to NK cell content does not appear to influence engraftment in ex vivo T cell depleted haploidentical stem cell transplantation. **Stem Cell Reports 2022** 17(3): 446-447.

In this publication, we compare clinical data with experimental work on mice that was conducted in collaboration with scientists in the USA and Brazil.

- Hason M, Jovicic J, Vonkova I, Bojic M, Simon-Vermot T, White RM, Bartunek P: Bioluminescent Zebrafish Transplantation Model for Drug Discovery. **Front Pharmacol 2022** 13: 893655.

  We have developed a new system for bioluminescent detection of transplanted cells that will accelerate the drug development process.

- Rysanek D, Vasicova P, Kolla JN, Sedlak D, Andera L, Bartek J, Hodny Z: Synergism of BCL-2 family inhibitors facilitates selective elimination of senescent cells. **Aging (Albany NY) 2022** 14(16): 6381-6414.

  Cellular senescence contributes to various pathologies. By elucidating the mechanism of resistance of senescent cells to BCL2 inhibitors, we found synergistic combinations of the senolytic effect of these agents.

- Prihoda D, Maamary J, Waight A, Juan V, Fayadat-Dilman L, Svozil D, Bitton DA: BioPhi: A platform for antibody design, humanization, and humanness evaluation based on natural antibody repertoires and deep learning. **MAbs 2022** 14(1): 2020203.

  We have developed a platform and interface for antibody design using automated methods that exploit the richness of natural antibody repertoires to develop therapeutics with desired properties.

- Chrienova Z, Rysanek D, Oleksak P, Stary D, Bajda M, Reinis M, Mikyskova R, Novotny O, Andrys R, Skarka A, Vasicova P, Novak J, Valis M, Kuca K, Hodny Z, Nepovimova E: Discovery of small molecule mechanistic target of rapamycin inhibitors as anti-aging and anti-cancer therapeutics. **Front Aging Neurosci 2022** 14: 1048260.

  Inhibition of mTor kinase is one of the promising therapeutic targets for the treatment of cancer and symptoms of aging. We have designed, prepared and tested a novel mTor kinase-inhibiting agent with senolytic effects.
  Collaborating institutions:
  1) University of Hradec Kralove
  2) Jagiellonian University Medical College, Krakow, Poland.

- Burkartová K, Dresler J, Rídl J, Falteisek L: Population Genomics of Microbial Biostalactites: Non-recombinogenic Genome Islands and Microdiversification by Transposons. **Front Microbiol 2022** 13: 828531.

When studying the intra-population genetic diversity of Ferrovum myxofaciens, we described gene damage caused by selfish genes and hypervariable regions of the genome with so-called gene scrapyards.

- Shaik GM, Draberova L, Cernohouzova S, Tumova M, Bugaev V, Draber P: Pentacyclic triterpenoid ursolic acid interferes with mast cell activation via a lipid-centric mechanism affecting FcεRI signalosome functions. **J Biol Chem 2022** 298(11): 102497.

  Ursolic acid (UA) is a bioactive pentacyclic triterpenoid with an unknown mechanism of action. This study shows that UA inhibits plasma membrane constituent mobility and immunoreceptor signaling.

- Valiskova B, Gregorova S, Lustyk D, Šimeček P, Jansa P, Forejt J: Genetic and chromosomal components of Prdm9-driven hybrid male sterility in mice (Mus musculus). **Genetics 2022** 222(1).

  Prdm9 is the only hybrid male sterility gene identified in vertebrates to date. The genetic and chromosomal components of the genetic architecture of hybrid infertility controlled by this gene have been defined.

- Králová J, Popr M, Valečka J, Bartůněk P: Sterolight as imaging tool to study sterol uptake, trafficking and efflux in living cells. **Sci Rep 2022** 12(1): 6264.

  We have characterized in detail a fluorescent probe suitable for the detection of cholesterol and other sterols in living cells, including visualization of intracellular and intercellular transport.

- Hornofova T, Pokorna B, Hubackova SS, Uvizl A, Kosla J, Bartek J, Hodny Z, Vasicova P: Phospho-SIM and exon8b of PML protein regulate formation of doxorubicin-induced rDNA-PML compartment. **DNA Repair (Amst) 2022** 114: 103319.

  The study clarifies that doxorubicin-induced PML protein association with the nucleus is regulated by tumor suppressors p14ARF/p53 and casein kinase 2, and shows for the first time that PML directly associates with ribosomal DNA.

- Delawská K, Divoká P, Sedlák D, Kuzma M, Saurav K, Macho M, Steinbach G, Hrouzek P: New Insights into Tolytoxin Effect in Human Cancer Cells: Apoptosis Induction and the Relevance of Hydroxyl Substitution of Its Macrolide Cycle on Compound Potency. **Chembiochem 2022** 23(1): e202100489.

We have characterized previously unknown antipoliferative activities of scytophycins, including the ability to activate programmed cell death via the mitochondrial pathway.

- Sunny SS, Lachova J, Dupacova N, Kozmik Z: Multiple roles of Pax6 in postnatal corneal development. **Dev Biol 2022** 491: 1-12.

  The development of the mammalian cornea is a multistep process involving formation of the corneal epithelium, endothelium and stroma during embryogenesis, followed by postnatal stratification of the epithelial layers and continuous renewal of the epithelium from limbal stem cells. This study shows that the Pax6 gene is required for differentiation and intercellular adhesion in postnatal epithelial cells, whereas limbal Pax6 is required to prevent the growth of conjunctival cells into the cornea.

- Gasic S, Mihola O, Trachtulec Z: Prdm9 deficiency of rat oocytes causes synapsis among non-homologous chromosomes and aneuploidy. **Mamm Genome 2022** 33(4):590-605.

  Aneuploidies (Down syndrome, etc.) are more common in the offspring of mothers with premature ovarian failure (POF). We have discovered a mechanism of aneuploid female germ cell emergence in a rat model of POF.

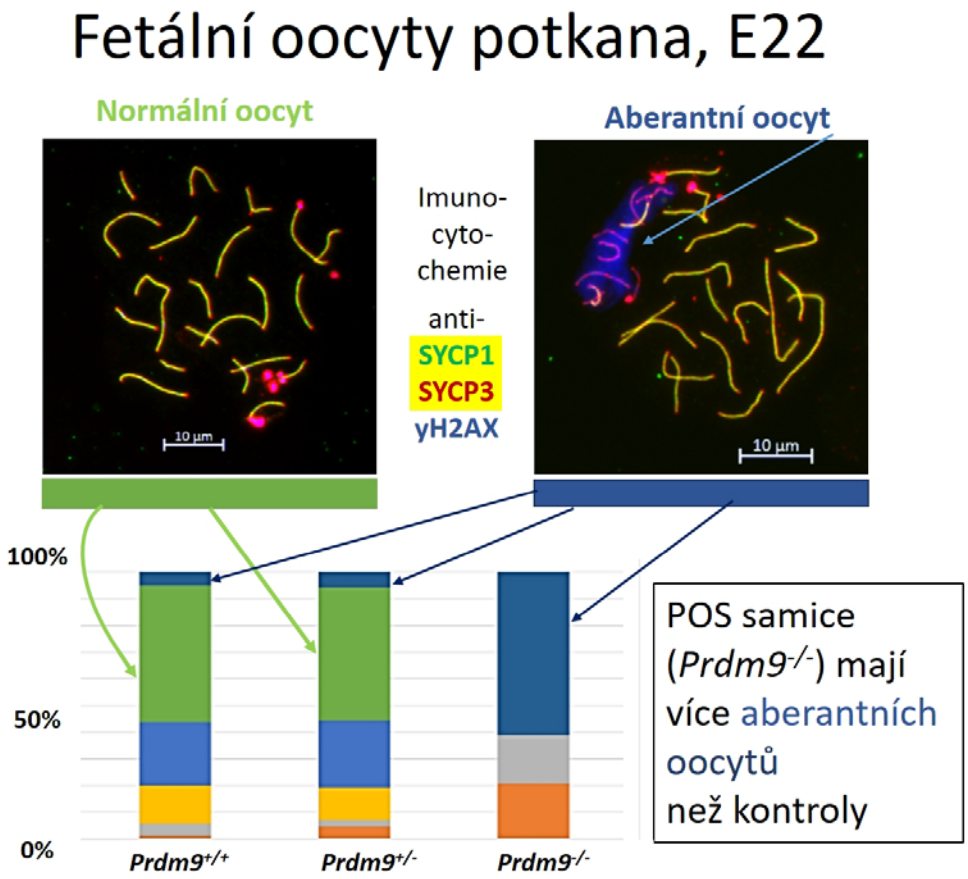

Illustration: Females with premature ovarian failure carry fewer normal oocytes. The figure illustrates (top) examples of normal and aberrant rat oocytes (22 days after conception, E22) stained by immunocytochemistry. Yellow lines are axes of normally synapsed chromosomes with repaired DNA breaks, red lines on blue background (light blue arrow) are axes of chromosomes with unrepaired DNA breaks. The lower part of the figure shows the percentage of different oocyte stages, including normal (green part of the bar) and aberrant (dark blue), in control females (Prdm9+/+, Prdm9+/-) and females with premature ovarian failure (POF, Prdm9-/-).

- Dibus N, Korinek V, Cermak L: FBXO38 Ubiquitin Ligase Controls Centromere Integrity via ZXDA/B Stability. **Front Cell Dev Biol 2022** 10: 929288.

  We describe a novel role for mutant ubiquitin ligase in neurodegenerative syndrome. This role is related to the regulation of chromatin localized in centromeric regions of chromosomes.

- Kovacech B, Fialova L, Filipcik P, Skrabana R, Zilkova M, Paulenka-Ivanovova N, Kovac A, Palova D, Rolkova GP, Tomkova K, Csokova NT, Markova K, Skrabanova M, Sinska K, Basheer N, Majerova P, Hanes J, Parrak V, Prcina M, Cehlar O, Cente M, Piestansky J, Fresser M, Novak M,

Slavikova M, Borsova K, Cabanova V, Brejova B, Vinař T, Nosek J, Klempa B, Eyer L, Hönig V, Palus M, Ruzek D, Vyhlidalova T, Strakova P, Mrazkova B, Zudova D, Koubkova G, Novosadova V, Prochazka J, Sedlacek R, Zilka N, Kontsekova E: Monoclonal antibodies targeting two immunodominant epitopes on the Spike protein neutralize emerging SARS-CoV-2 variants of concern. **EBioMedicine 2022** 76: 103818.

SARS-CoV-2 variants are often resistant to therapeutic antibodies. We have developed a mouse model to test combinations of therapeutic antibodies to prevent SARS-CoV-2 escape mutations.

- Gazdarica M, Noda J, Durydivka O, Novosadova V, Mackie K, Pin JP, Prezeau L, Blahos J: SGIP1 modulates kinetics and interactions of the cannabinoid receptor 1 and G protein-coupled receptor kinase 3 signalosome. **J Neurochem 2022** 160(6): 625-642.

  SGIP1 affects cannabinoid receptor 1 (CB1R) signaling for endocannabinoids, including cannabis from marijuana. Thus, it is involved in the perception of pain, emotion and mood in vivo. In another project, we described how association with SGIP1 affects the association and action of molecules regulating CB1R desensitization.

3.1.4 ORGANIZATIONAL STRUCTURE

The detailed organizational structure valid in 2022 is set out in Annex No. 1. More detailed information on the groups is available in the Annual Reports, which are published in regular cycles and posted on the Institute website - see https://www.img.cas.cz/o-ustavu/rocenky-a-vyrocni-zpravy/.

Changes effective from January 1st, 2022:
The position of Secretary and its description was added to the Organizational Rules.
The Laboratory of Haematooncology (No. 46) was transferred from the Junior Group to the Senior Group.
The Laboratory of Genome Dynamics (No. 49) was transferred from the Guest Group to the Junior Group.
The Laboratory of Leukocyte Signaling (No. 45) was transferred from the Senior Small Group to the Senior Group.
The Laboratory of Cell Motility (No. 47) was transferred from IMG Fellows to Junior Groups.
A new Junior Group, the Laboratory of Developmental Mechanobiology (No. 10), was established.
The Laboratory of Structural Biology (No. 31) was cancelled.

Changes effective from November 1st, 2022:
The agenda of the Institute Lawyer was transferred to Department No. 53 Administrative Team.

The grant agenda was transferred to Department No. 51 Economy Department.

3.1.5 DOMESTIC AND INTERNATIONAL AWARDS FOR EMPLOYEES OF THE INSTITUTE (AWARDED IN 2022)

Teije Corneel Middelkoop
Lumina Quaeruntur Award for the Exceptional Quality Project of the new research group of IMG. The award was given by the Academy of Sciences of the Czech Republic.

Radislav Sedlacek
The František Běhounek Award for participation in European collaborative projects in the field of research, experimental development and innovation, which contributed to the promotion and popularisation of the awarded scientific field and to spreading the good name of the Czech Republic in Europe. The award was presented by the Minister of Education, Youth and Sports.

Jiri Bartek
Honorary doctorate from Charles University for pioneering discoveries in the fields of cell biology and cancer research. The prize was awarded by Charles University.

Oksana Tsyklauri and Veronika Niederlova
Jaroslav Šterzl Award for the publication "Tsyklauri O, Niederlova V et al. EMBO Rep. 2021 Feb 3;22(2):e50785". The prize was awarded by the Czech Immunological Society.

3.1.6 SIGNIFICANT SCIENTIFIC EVENTS AT THE NATIONAL LEVEL, WHICH THE INSTITUTE ORGANIZED OR CO-ORGANIZED

- **Event name: 4th CCP Conference**
  Date and venue: 15 - 16 September 2022, IMG, BIOCEV, Vestec
  Main organizer of the event: CCP, IMG (R. Sedláček)
  Co-organizer(s): ---
  Speakers from the IMG: Radislav Sedláček, Petr Nickl
  Total number of participants: approx. 200
  Notable presentations: Ophir Klein, Len Pennacchio, Damian Smedley
  Event website: https://www.ccp-conference.cz/
  Contact person: Radislav Sedláček
  Patronage: -

- **Event name: 5th Czech Cilia Meeting**

Date and venue: 27 June 2022, IMG, Prague, Czech Republic
The main organizer of the event: IMG (Martina Huranová)
Co-organizer(s): ---
Names of speakers from the IMG: Vladimír Varga, Peter Gorilák, Marie Zelená
Total number of participants: 30
An important presentation: Dr. Lotte Bang Pedersen, UCPH Copenhagen
Event website: ---
Contact person: Martina Huranová, Vladimír Varga
Patronage: ---

- **EMBO Workshop on Research Integrity**
  Date and venue: 24 November 2022, IMG, Prague, Czech Republic
  The main organizer of the event: EMBO (Sandra Bendiscioli)
  Co-organizer(s): IMG (Petr Svoboda), IMG (Peter Šebo)
  Names of speakers from the IMG: Petr Svoboda
  Total number of participants: 36
  An important presentation: ---
  Event website: https://course.img.cas.cz/embori/program/
  Contact person: Petr Svoboda
  Patronage:

- **Event name: ENBIK2022 - National Bioinformatics Conference**
  Date and venue: 13 - 15 June 2022, Němčice u Kolína
  The main organizer of the event: CZ-OPENSCREEN, VŠCHT (Daniel Svozil)
  Co-organizer(s): CZ-OPENSCREEN, IMG (Michal Kolář)
  Names of speakers from the IMG:
  Total number of participants: 93
  An important presentation:
  Event website: http://enbik.cz/enbik2022/programme/
  Contact person: Daniel Svozil
  Patronage: CZ-OPENSCREEN

3.2 EDUCATIONAL ACTIVITIES

3.2.1 ORGANIZATION OF PRACTICAL TRAINING COURSES

- **Course name: 46th Advances in Molecular Biology and Genetics 2022**
  Course description (objective): The aim of the course, conducted in English, was to provide information on current scientific advances in the field of molecular biology, genetics and biomedicine with some biotechnological perspectives in a lecture format (40 lectures, each 45

min + 5 min discussion, divided into 7 panels: DNA/Nucleus, Genomics, RNA Biology, Proteins, Cell Biology, Developmental Biology, Biomedicine). In the form of a 1-day workshop, career building in science, writing scientific papers in proper English, scientific ethics, cheating in science, and communication in science were also discussed.
The lecturers at the course are always renowned scientists, mostly from institutes of the Academy of Sciences and universities, but also from abroad (this year 1 speaker). The course was concluded by entering the credit in the index and/or in SIS.
Place and date of the course: the IMG, Prague, 31 October - 11 November 2022
Course duration (number of days): 10 working days
Number of participants: 80
Additional information: the course has been held regularly, every year since 1977. The course is accredited (MPGS OO34) by Charles University under the Association Agreement and other agreements between Charles University and CAS on the joint approach to the education of PhD students in the field of biomedicine. It is intended primarily for PhD students in the 1st and 2nd year of study in this field under the umbrella of the Doctoral Programmes in Biomedicine (DSPB) at Charles University and CAS. All lectures are audio and visually recorded to enable students to access them later from a password-protected website.
Organizers and guarantors of the course: professor Jiří Jonák, MD, DSc, and professor Petr Svoboda, PhD, scientists from the IMG

- **Course title: CCP Course "Python for Scientists"**
  Course description (goal): Introduction to Python
  Place and date of the course: Vestec, 19 - 20 October 2022
  Course duration (number of days): 2
  Number of participants: 25

- **Course title: Microscopic image processing and analysis in biomedicine**
  Course description (objective): Theoretical course with practical exercises and demonstrations for postgraduate teaching in biology and medicine. The course is the only one of its kind in the Czech Republic and provides the basic knowledge necessary for qualified work with microscopes of various types and for subsequent processing of the obtained digital image. The course is included in the elective courses of doctoral studies at several subject-area committees.
  Place and date of the course: IMG, Prague, 4 - 8 April 2022
  Course duration (number of days): 5
  Number of participants: 21

- **Course title: Microscopic Methods in Biomedicine**
  Course description (objective): Theoretical course with demonstrations and practical exercises for 30 participants covers modern methodology of light and electron microscopy including principles of preparation of biological specimens. The course also includes an introduction to the technique of probe microscopy (atomic force microscopy) and its demonstration. The course is the only one of its kind in the Czech Republic and provides the basic knowledge necessary for qualified work with microscopes of various types. The emphasis is on progressive methods of microscopy and observation of processes in live cells. The course is included in the elective courses of doctoral studies at several subject-area committees.
  Place and date of the course: IMG, Prague, 17 - 21 October 2022

Course duration (number of days): 5
Number of participants: 30

- **Course title:** **Transmission Electron Microscopy in Biomedicine**
  Course description (objective): The course is designed for beginners to intermediate users of transmission electron microscopy in biomedicine. It focuses on the theory and practical use of microscopes. During the course, participants should understand the principles of TEM design and its functions. Participants should be able to adjust the microscope for optimal performance, identify and remove the most common aberrations and compensate for artifacts. Attendees will receive up-to-date information on the best methods of sample preparation for TEM as well as the latest trends in biomedical science.
  Place and date of the course: IMG, Prague, 21 - 25 November 2022
  Course duration (number of days): 5
  Number of participants: 14

- **Course name:** **IVIM - IntraVital Microscopy Workshop**
  Course description (aim): Introduction to special microscopy.
  Place and date of the course: Vestec, 15 - 16 September 2022
  Course duration (number of days): 2
  Number of participants: 20

- **Course name:** **Isoplexis IsoLight Automated Celluar Proteomic in CCP**
  Course description (goal): Introduction to special technology.
  Place and date of the course: Vestec, 8 August 2022
  Course duration (number of days): 1
  Number of participants: 12

3.2.2 PARTICIPATION OF THE INSTITUTE IN SECONDARY EDUCATION (SECONDARY SCHOOL TEACHING)

- lectures at secondary schools, supervision of high-school specialized works, and others, e.g.:
  - Běstvina Camp organized by the University of Technology in Prague - lectures on epigenetics and gene manipulation for high school students
  - FYBICH Summer School organized by Contipro a.s. - lecture on epigenetics for high school students
  - Bakala Scholarship organized by the Bakala Foundation - participation in the selection of high school and university students for the scholarship
  - lecture on CRISPR technology within the event "CRISPR Technology" organized by Civil Engineering High School and Trade Academy in Kladno

3.2.3 EDUCATING THE PUBLIC

- participation of employees in discussion programmes organized by TV and radio (e.g., Czech Radio, iDNES TV)
- participation in various science popularization activities (e.g., Night of Scientists, Open Doors Day, The Gene Age lecture series, Youth Academy at the University of Chemistry and Technology in Prague)
- press releases

3.2.4 TEACHING ACTIVITIES - SEMESTER LECTURES AND COURSES IN THE SCHOOL YEAR 2022/2023

- **Tomáš Brdička, Václav Hořejší, Ondřej Štěpánek**
  "Immunology", Faculty of Science, Charles University
- **Lukas Cermak**
  "Protein dynamics in development and cancer", Faculty of Science, Charles University
- **Pavel Dráber**
  "Structure and Function of the Cytoskeleton", Faculty of Science, Charles University
- **Petr Dráber**
  "Grant Application Strategy", Faculty of Science, Charles University
- **Dominik Filipp**
  "Innate Immunity", Faculty of Science, Charles University
- **Martin Gregor**
  "Transgenic models in physiology", Faculty of Science, Charles University
- **Hana Hanzlíková**
  "Advances in Molecular Biology and Genetics", Faculty of Science, Charles University
- **Zdeněk Hodný**
  "Physiology of aging, cellular senescence and carcinogenesis", Faculty of Science, Charles University
- **Henry Henry**
  "Chemical Informatics", Faculty of Science, Charles University
- **Michal Kolar**
  "Systems Biology (PhD)", Faculty of Chemical Technology, University of Chemistry and Technology, Prague

- **Michal Kolář, Jiří Novotný**
  "Gene Expression Analysis", Faculty of Chemical Technology, University of Chemistry and Technology, Prague

- **Vladimír Kořínek, Lucie Láníková**
  "Molecular Biology of Cancer I", Faculty of Science, Charles University

- **Zbyněk Kozmik**
  "Model organisms in developmental biology", Faculty of Science, Charles University

- **Libor Macůrek**
  "Molecular mechanisms of cell cycle regulation", Faculty of Science, Charles University

- **Jan Paches**
  "Case Studies in Bioinformatics", Faculty of Chemical Technology, University of Chemistry and Technology, Prague

- **Jan Paches**
  "Bioinformatics", Faculty of Science, Charles University

- **Jan Pačes, Michal Kolář**
  "Phylogenomics and Applied Genomics", Faculty of Chemical Technology, University of Chemistry and Technology, Prague

- **Jan Pačes, Petra Svatoňová**
  "Genomics: algorithms and analysis", Faculty of Chemical Technology, University of Chemistry and Technology, Prague

- **David Stanek**
  "Structure and Function of RNA", Faculty of Science, Charles University

- **Petr Svoboda**
  "Epigenetics", Faculty of Science, Charles University, Faculty of Science, University of South Bohemia

- **Petr Svoboda**
  "Advances in Molecular Biology and Genetics", 1st - 3rd Faculty of Medicine, Charles University, Faculty of Science, Charles University

- **Ondřej Štěpánek, Veronika Niederlová**
  "Advances in Immunology", Faculty of Science, Charles University

- **Kateřina Trejbalová**
  "Medical Virology and Viral Pathogenesis", Faculty of Science, Charles University

3.3 ACTIVITIES FOR PRACTICE

3.3.1 RESULTS OF COOPERATION WITH THE BUSINESS COMMUNITY AND OTHER ORGANIZATIONS OBTAINED THROUGH PROJECTS

- **The name of the result:** **In vivo validation of novel antibodies against Covid-19 disease**
  Project/programme: ---
  Achieved result: publication
  Application/Output Citation: EBioMedicine.2022Feb;76:103818.doi: 10.1016/j.ebiom.2022.103818. Epub 2022 Jan 22.
  Partner organizations: ---
  Provider: cooperation with AXON COVIDAX a. s.

- **The name of the result:** **Creation of KO poultry line spo11**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: validated technology.
  Application/Quote for Output: Production of modified organisms with commercial line potential.
  Partner organizations: ---
  Provider: TA CR

- **The name of the result:** **Bacteria producing temperature-resistant recombinant TgRI ligase**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: validated technology.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

- **The name of the result:** **Antibody against PTHrP protein**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: functional sample.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

- **The name of the result:** **Antibody against GCP3 protein**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: functional sample.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

- **The name of the result:** **Anti-GST protein antibody**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: functional sample.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

- **Result name:** **iPCR kit for γ-tubulin detection**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: prototype.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

- **The name of the result:** **Apta1-Spike-SARS-CoV-2 aptamer specifically binding to the spike protein of SARS-CoV-2 virus**
  Project/programme: Applied Molecular Genetics and Biology - IMG GAMMA 2 / GAMMA 2
  Achieved result: functional sample.
  Application/citation of the output: use in molecular biology.
  Partner organizations: ---
  Provider: TA CR

3.3.2 IMPORTANT PATENTS, UTILITY MODELS, INVENTIONS, LICENSING AGREEMENTS, TRADEMARKS

- **Title:** **Licence Agreement - Sale of Plasmid - Bacteria Producing Temperature Resistant Recombinant TgRI Ligase**
  Category: Licence Agreement
  Registered under number: ---
  Description: License agreement for the sale of a TgRI ligase-producing plasmid prepared at the IMG.
  Use: For commercial production of TgRI ligase.
  Contact person: Pavol Utekal, PhD, +420 296 442 656, pavol.utekal@img.cas.cz

- **Title:** **Licence Agreement - Sale of Media and Labelling Kit**
  Category: Licence agreement
  Registered under number: ---
  Description : License agreement for the sale of a kit of mounting media and a slide labelling system for microscopy applications.
  Use: For commercial and academic microscopy applications.
  Contact person: Ivan Novotný, PhD; +420 777 270 279, ivan.novotny@img.cas.cz

- **Title:** **A method for detection and quantification of RNA using a thermoresistant ligase from the thermophilic bacterium Thermococcus gorgonarius**
  Category: Patent application
  Registered under number: PV 2022-352
  Description : Preparation of a bacterial strain producing a novel recombinant temperature-resistant TgRl ligase.
  Use: For commercial production of TgRI ligase.
  Contact person: RNDr. Pavol Utekal, CSc., +420 296 442 656, pavol.utekal@img.cas.cz

- **Title:** **Phospholipid derivatives and their use as pharmaceuticals**
  Category: Patent in China
  Registered under number: CN110494143B
  Description: Bioactive agent with potential for use as an active ingredient in drugs for oncological indications.
  Use: For commercial production of pharmaceuticals.
  Contact person: Michal Dvořák, PhD, +420 296 443 390, michal.dvorak@img.cas.cz

- **Title:** **Phospholipid derivatives and their use as pharmaceuticals**
  Category: US patent
  Registered under number: US11414443B2
  Description: Bioactive agent with potential for use as an active ingredient in drugs for oncological indications.
  Use: For commercial production of pharmaceuticals.
  Contact person: Michal Dvořák, PhD, +420 296 443 390, michal.dvorak@img.cas.cz

- **Title:** **Phospholipid derivatives and their use as pharmaceuticals**
  Category: Patent in Canada
  Registered under number: CA3058792C
  Description: Bioactive agent with potential for use as an active ingredient in drugs for oncological indications.
  Use: For commercial production of pharmaceuticals.
  Contact person: Michal Dvořák, PhD, +420 296 443 390, michal.dvorak@img.cas.cz

3.3.3 PROFESSIONAL EXPERTISE PREPARED IN WRITTEN FORM FOR STATE AUTHORITIES, INSTITUTIONS AND BUSINESS ENTITIES

4 (SKV-POPR: the role of the evaluator in assessing results according to M17+) (Z. Trachtulec)

3.3.4 RESULTS OF COOPERATION WITH THE BUSINESS COMMUNITY AND OTHER ORGANIZATIONS OBTAINED ON THE BASIS OF ECONOMIC CONTRACTS

- **Title:** **Carrying out laboratory tests**
  Contracting authority: Sotio Biotech a.s.
  Abstract: Using relevant mouse models, laboratory tests are being conducted to optimize the use of RLI-15 and other agents in various therapeutic settings. These tests must precede clinical trials for ethical and scientific reasons.
  Application: to generate data that will be used to design and conduct further preclinical and clinical studies; to publish scientific articles.

- **Title:** **Histopathological evaluation of the effects of newly developed veterinary vaccines**
  Contracting authority: Dyntec spol. s r.o.
  Abstract: New veterinary vaccines must be tested before they are introduced into practice.
  Application: veterinary practice.

- **Title:** **Histopathological analysis of the effects of newly developed drugs against Covid-19 disease**
  Contracting authority: Apigenex s.r.o.
  Abstract: The efficacy of new potential drugs must first be tested in animal models before they can proceed to clinical trials.
  Application: for further drug development.

- **Title:** **Histopathological analysis of samples from toxicity study.**
  Contracting authority: Institute of Physiology of the CAS
  Abstract: New potential drugs must first be tested for safety (toxicity) in animal models before they can proceed to clinical trials.
  Application: for further drug development.

- **Title:** **Establishment of mouse tumour models of cancer**
  Sotio Biotech, a.s. and Sotio Biotech AG
  Annotation: possible future applications in research, models for testing new therapeutic agents.
  Application: indispensable for development of new immunotherapeutics, in vivo testing prior to drugs entering the first phase of clinical testing.

- **Title:** **Characterization of a model for Angelman syndrome**
  ASGENT, Association of Gene Therapy
  Annotation: creation and description of the mouse model.
  Application: drug testing.

3.4 INTERNATIONAL SCIENTIFIC COLLABORATION

3.4.1 OVERVIEW OF INTERNATIONAL PROJECTS THAT THE INSTITUTE IS WORKING ON AS PART OF INTERNATIONAL SCIENTIFIC PROGRAMMES

- **Mobility project of the CAS - 2**

  CAS Mobility Plus - JSPS-20-06

  CAS Mobility - PAN-20-14
- **MEYS - INTER_EXCELLENCE - INTER-COST - 2**

  INTER-COST (LTC19048)

  INTER-COST (LTC20024)
- **MEYS - INTER_EXCELLENCE - INTER-ACTION - 3**

  INTER-ACTION (LTAUSA18103)

  INTER-ACTION (LTAUSA19096)

  INTER-ACTION (LTAUSA19118)
- **MEYS - Mobility - Czech-Polish projects - 1**

  (8J20PL063)
- **MEYS - Joint Programming Initiative Call - 1**

  (8F19007)

3.4.2 EU PROJECTS

- **Type of framework programme:** HORIZON EUROPE

  Project acronym: EOSC4Cancer

  Project number and identification code: 101058427

  Project type: HORIZON-INFRA-2021-EOSC-01

  Project name: A European-wide foundation to accelerate Data-driven Cancer Research

  Coordinator: Barcelona Supercomputing Center-Centro Nacional De Supercomputacion, Spain

  Investigator for the IMG: P. Bartůněk

- **Type of framework programme:** Horizon 2020

  Project acronym: SIDSCA

Project number and identification code: 694996

Type of project: ERC AG

Project name: Defective DNA Damage Responses in Dominant Neurodegenerative Diseases

Coordinator: University of Sussex, UK

Investigator for the IMG: Keith Caldecott

- **Type of framework programme:** Horizon 2020

  Project acronym: FunDiT

  Project number and identification code: 802878

  Project type: ERC STG

  Project name: Functional Diversity of T Cells

  Coordinator: IMG

  Investigator for the IMG: Ondřej Štěpánek

- **Type of framework programme:** Horizon 2020

  Project acronym: EU-OPENSCREEN-DRIVE

  Project number and identification code: 823893

  Type of project: INFRADEV

  Project name: Ensuring Long-term Sustainability of Excellence in Chemical Biology within Europe and beyond EU-OPENSCREEN

  Coordinator: Forschungsverbund Berlin Ev, Germany

  Investigator for the IMG: Petr Bartůněk

- **Type of framework programme:** Horizon 2020

  Project acronym: EOSC-Life

  Project number and identification code: 824087

  Type of project: INFRAEOSC

  Project name: Providing an Open Collaborative Space for Digital Biology in Europe

  Coordinator: EMBL, Germany

  Investigator for the IMG: Radislav Sedláček, Petr Bartůněk

- **Type of framework programme:** Horizon 2020

  Project acronym: ENHPATHY

  Project number and identification code: 860002

Project type: MSCA-ITN

Project name: Molecular Basis of Human Enhanceropathies

Coordinator: Inserm, France

Investigator for the IMG: Meritxell Alberich Jorda

- **Type of framework programme:** Horizon 2020

  Project acronym: Algae4IBD

  Project number and identification code: 101000501

  Project type: FNT-11-2020

  Project name: Algae4IBD - from Nature to Bedside-Algae based Bio compound for Prevention and Treatment of Inflammation, Pain and IBD

  Coordinator: Migal Galilee Research Institute LTD, Israel

  Investigator for the IMG: David Sedlák

- **Type of framework programme:** EC - Horizon Europe

  Project acronym: ISIDORe

  Project number and identification code: 101046133

  Project type: HORIZON-INFRA-2021-EMERGENCY-02

  Project name: ISIDORe - Integrated Services for Infectious Diseases Outbreak Research

  Coordinator: European Research Infrastructure On Highly Pathogenic Agents, Belgium

  Investigator for the IMG: R. Sedláček, P. Hozák, P. Bartůněk

- **Type of framework programme:** EC - Horizon Europe

  Project acronym: GetRadi

  Project number and identification code: 101072427

  Type of project: MSCA DN 2021

  Project name: GetRadi - Gene Therapy of Rare Diseases

  Coordinator University of Copenhagen, Denmark

  Investigator for the IMG: R. Sedláček

3.4.3 EVENTS WITH INTERNATIONAL PARTICIPATION, WHICH THE INSTITUTE ORGANIZED OR CO-ORGANIZED

- **Event name: Global and European Infrastructures IMPC and INFRAFRONTIER Towards the Deciphering of Gene Functions for Human Health**

  Main organizer: INFRAFRONTIER and IMPC

  Co-organizer: CCP, IMG

  Date and venue: 18 October 2022, hybrid - Brno + zoom

  Total number of participants: 50

  Event website: https://www.phenogenomics.cz/2022/10/join-infrafrontier-impc-satellite-event-at-icri-2022/

  Important presentation: ---

  Contact person: Radislav Sedláček

- **Event name: European Conference on** Tetraspanins

  Main organizer: IMG

  Date and venue: 28 - 30 September 2022, Prague

  Total number of participants: 65

  Event website: https://ect.img.cas.cz/

  Important presentation: an important presentation attended not only by researchers from Europe, but also from the USA and Australia.

  Contact person: Ivana Hálová

- **Event name: Annual Scientific Conference Czech-BioImaging - Imaging Principles in Life 2022**

  Main organizer: IMG

  Date and place: 4 - 5 October 2022, Hustopeče

  Total number of participants: 96

  Event website: https://www.czech-bioimaging.cz/conference

  Centre for Cellular Imaging - a Research Infrastructure for Correlated Multimodal Imaging, Julia Fernandez-Rodriguez, Centre for Cellular Imaging, Shalgrenska Academy, University of Gothenburg, Sweden.

  Contact person: Pavel Hozák

- **Event name: 16th International Congress of Histochemistry and Cytochemistry 2022**

Main organizer: International Federation of Societies for Histochemistry and Cytochemistry (IFSHC)

Co-organizer: Society for Histochemistry (SFH), IMG

Date and venue: 28 - 31 August 2022, Prague

Total number of participants: 104

Event website: https://www.ichc.website/

Important presentations:

New Roles of Lipid Droplets: A Histochemical Journey, Fujimoto T., Juntendo University Graduate School of Medicine, Tokyo, Japan;

From actin to lamins by in situ structural biology, Medalia O., University of Zurich, Switzerland;

MINFLUX nanoscopy and related matters S. W. Hell, Max Planck Institute for Biophysical Chemistry, Göttingen, Germany.

Contact person: Pavel Hozák

- **Event title: 7th BAJ Symposium "Gene Regulation, Stem Cells and Leukemia"**

  Main organizer: IMG

  Co-organizer: Städtisches Klinikum Dessau, Dessau-Roßlau, Germany

  Date and venue: 2 - 3 June 2022, IMG, Prague, Czech Republic

  Total number of participants: 7

  Event website: ---

  Important presentation: ---

  Contact person: Meritxell Alberich Jorda

- **Event name: 32nd Workshop on Retroviral Pathogenesis**

  Main organizer: University of Colorado Denver, Mario Santiago

  Co-organizers: IMG, Univ. Chicago, Univ. Calif. Irvine, CA, USA

  Date and venue: 12 - 16 October 2022, Grand Hyatt Vail, Colorado, USA

  Total number of participants: 75

  Event website: https://web.cvent.com/event/CC7882A0-200B-4ED8-9025-A09CD544B46E

  Important presentation: ---

  Contact person: Mario Santiago, Jiří Hejnar

3.5 THE MOST IMPORTANT POPULARIZATION AND PROMOTIONAL ACTIVITIES

- **The Gene Age (Prague (National Museum), Ostrava, Olomouc (Fortress of Knowledge), Brno (VIDA), Pilsen (Techmania)**

  Activity Description: Lecture series.

  Organizer: IMG, CCP

  Venue and date: Various locations in the Czech Republic, in the course of 2022.

- **Television appearances, radio and internet interviews, discussion programmes, articles**

  Activity description: awareness-raising activities on the coronavirus pandemic.

  Organizers: various

  Venue and date: in the course of 2022.

- **Open Doors Day at IMG**

  Description of activity: the Institute took part in the festival of the Week of the CAS. We were visited by several high schools, including schools with foreign students. The students visited some laboratories, where they were shown typical experiments in molecular genetics, immunology, cell biology, and virology and could also attend several lectures.

  Organizer: Czech Academy of Sciences

  Place and date: IMG, November 14th, 2022

- **Other popularization results:** appearances of IMG researchers in radio, television (e.g., Czech Radio, CT 24) and articles in magazines (e.g. Vesmír, Týden, Reports from Industry), daily press (Hospodářské noviny, Lidové noviny, Mladá fronta Dnes) and on servers (Aktualne.cz, Tyden.cz).

3.6 PARTICIPATION OF IMG IN ASSOCIATIONS

1) Technology Centre Prague z.s.p.o. (Change of name from November 14th, 2022.)
2) Infrafrontier GmbH

4. EVALUATION OF FURTHER AND OTHER ACTIVITIES

The Institute records other activities, which include rentals from leased areas, land, equipment rentals (vending machines; lecture halls, equipment, entrance hall, meeting point for events or film crews), income from conferences (advertising, company presentations at conferences, potentially sponsors), and provision of pre-school educational and training services on the Institute premises through an external entity.

5. INFORMATION ON THE MEASURES TAKEN TO REMEDY MANAGEMENT DEFICIENCIES AND A REPORT ON HOW THE REMEDIAL MEASURES IMPOSED IN THE PREVIOUS YEAR HAVE BEEN IMPLEMENTED

The last management audit of the Institute was carried out by the founder in 2016 and the "Report on the implementation of measures leading to the elimination of deficiencies identified by the management audit" was sent to the founder with the required documents on August 30th, 2019, and the audit was subsequently completed in 2019. The Institute is observing the adopted measures.

6. FINANCIAL INFORMATION ABOUT FACTS THAT ARE MATERIAL TO THE ASSESSMENT OF THE INSTITUTION'S ECONOMIC POSITION AND MAY AFFECT ITS DEVELOPMENT *)

Management of the Institute in terms of financial resources and costs incurred

Structure of financial resources	in percentage	in CZK
State	71.47 %	622 235 603.00
Non-state	28.53 %	248 395 874.00

State:	institutional	44.78 %	278 643 308.00
	specific	0.00 %	0.00
	from other ministries	55.22 %	343 592 295.00
Sources:	research activities	73.42 %	639 261 073.00
	other activities	26.58 %	231 370 404.00
Basic:	sales (of products, goods and services)	5.05 %	44 002 984.00
	other income	21.52 %	187 367 420.00
	SB resources (including transfers from various SB chapters)	71.47 %	622 235 603.00
	other sources (domestic and foreign)	1.96 %	17 025 470.00
Cost analysis			
Total costs		100,00 %	856 028 068.00
Average monthly costs (cumulative since the beginning of the year)			71 335 672.33
Cost:	personnel	43.83 %	375 177 769.00
	material	56.17 %	480 850 299.00
Personnel costs per employee			803 378.52
Material costs per employee			1 029 658.03
Total costs per employee			1 833 036.55
Energy demand (share of total costs)		7.27 %	62 231 160.00
Energy costs per employee			133 257.30
Material demand (share of total costs)		10.55 %	90 289 500.00
Material costs per employee			193 339.40
Total travel costs (share of total costs)		0.64 %	5 468 108.00
Travel expenses for 1 employee			11 709.01
Economic result			
Profit (+); loss (-); (share of total costs)		1.44 %	12 349 259.00

The accounting result of 2022 - profit of CZK 12,349,258.60 will be transferred to the reserve fund and CZK 1,000,000 to the social fund after approval by the IMG Council.

More detailed information on the Institute management together with the auditor's report is provided in Annex No. 2.

Auditor's Opinion:

In our opinion, the financial statements give a true and fair view of the assets and liabilities of the IMG as of December 31st, 2022 and of the costs, revenues and results of its operations for the year ended on December 31st, 2022 in accordance with the Czech accounting regulations.

*) Data required under Section 21 of Act No. 563/1991 Coll., on Accounting, as amended.

7. EXPECTED DEVELOPMENT OF THE INSTITUTE *)

The Institute has created material conditions for successful development, fully comparable with high-quality institutions in Western Europe and the USA. The activities of all four major national research infrastructures located at the IMG are important for the work of the Institute: the Czech Centre for Phenogenomics, CZ-OPENSCREEN, Czech-BioImaging and ELIXIR CZ. The financial support within the framework of the OP VVV is crucial for the work of these infrastructures. The research at the Institute of Molecular Genetics is partly supported by extra-budgetary resources from domestic (CSF, TA CR, MIT, MA, MEYS) and foreign providers. However, the insufficient international character of the Institute persists. Although the scientific language of the Institute is English, which is used for professional seminars and meetings of the heads, only three heads of research groups are from abroad. In an effort to improve this situation, a competition was organized to fill the position of new heads of department for the BIOCEV site. In addition, a call was launched for a leader of a group dealing with the poultry model. In terms of research focus, scientific research will concentrate, in accordance with the Foundation Deed, on research in the field of molecular basis of major diseases, especially cancer, on molecular and cell biology, molecular immunology, functional genomics and bioinformatics, oncogene studies, developmental molecular biology, structural biology and receptor signalling mechanisms. Following the coronavirus pandemic, new lines of research have been initiated including development of monoclonal antibodies and aptamers against SARS-CoV-2, along with new avenues for SARS-CoV-2 research in a mouse model. Particular attention will be paid to work with pathogens under in vivo conditions within the newly built facility at the BIOCEV Centre.

The Institute has a simple, fair and efficient system for allocating institutional wage funds to groups. Close collaboration with universities, mainly through the involvement of students (PhD students and graduates) in scientific research, and active pedagogical involvement of our researchers at the faculties will continue to be a fundamental feature of the Institute work. We consider basic research to be a priority area of the Institute activities, the main output of which is represented by publications in prestigious international scientific journals. In the coming years, we would also like to support even more valuable applied research, aimed at specific practical implementation of basic research, cooperation with biotechnological companies and possible establishment of a spin-off company of IMG. In the field of basic and applied research, our aim is to more closely link the activities of the Academy institutes within the Krč campus and the BIOCEV Centre. An example of a result of

these efforts is the Proteomics Service Laboratory, which was established through collaboration between IMG and the Institute of Physiology and started its activities in early 2021. At this stage, we consider it important to strengthen this facility with bioinformaticians. We continue to strive for closer integration of the biomedical Academy institutes in Krč and Vestec into a scientifically strong complex of biologically oriented institutions in the south of Prague. Joint methodological seminars organized for both locations are one of the contributions to this aim.

BIOCEV - Biotechnological and Biomedical Centre of the CAS and Charles University in Vestec

Since January 1st, 2021, the cooperation between the BIOCEV partner organizations is governed by the rules set out in the new Partnership Agreement and the Lease Agreement, which set out the legal titles of the individual institutions to use the infrastructure built within the BIOCEV project. In 2021, in accordance with the Law on Public Research Institutions, part of assets of the Institute of Molecular Genetics were transferred to the Institute of Biotechnology free of charge. The decision to transfer the assets of the BIOCEV project from IMG to IBT in 2022 was assessed by the management of the Institute as a correct step, driven by the desire to ensure that the assets are primarily taken care of by the partner that uses the assets. The cooperation between the partners of the BIOCEV project continues in the context of the new Partnership and Lease Agreement. We want to continue to strengthen the quality of the research groups of IMG located in the BIOCEV Centre and to contribute to the fact that the BIOCEV Centre will continue to be a catalyst for effective cooperation between IMG and all other partner organizations of the BIOCEV project.

8. ENVIRONMENTAL ACTIVITIES *)

Waste segregation is strictly observed at all the Institute units. A contract has been concluded with REMA Systém, a.s., for the collection of electrical equipment.

9. LABOURLAW RELATIONSHIP ACTIVITIES *)

Analysis of the use of wage funds for 2022

Source of funds	Wages in thous. CZK	Other pers. costs in thous. CZK
foreign grants, donations and other funds (Article 0)	5 654	0
domestic donations (Art. 0)	0	0
grants of the CAS (Art. 1)	0	0

grants of the CSF (Art. 3)	39 099	45
grants of the TA CR (Art. 10)	1 836	91
projects of other providers (Art. 4)	82 442	447
subsidies for activities (Art. 5)	5 194	24
main activity contracts (Art.7)	14 284	677
institutional - overheads (Art. 8)	0	0
institutional - extra-budgetary (Art. 8)	3 804	88
Institutional – support of research organization	114 488	1 744
Total	**266 801**	**3 116**
Total (wages + other personnel costs)	**269 917**	

Breakdown of wage funds by source

wage funds	thous. CZK	%
institutional (Arts. 5+8+9)	123 486	46.28
specific (Arts. 1+6)	0	0.00
extra-budgetary (Arts. 3+4+10)	123 377	46.24
other extra-budgetary (Arts. 0+2+7)	19 938	7.47
Total	**259 963**	**100.00**

Wages paid by component

Wage component	thous. CZK	%
basic salary	142 465	55.73
personal premium	71 287	25.52
leadership premium	758	0.29
other wage components	339	0.10
total bonuses	24 409	8.79
wage compensation	27 543	9.57
Total	**266 801**	**100.00**

Other personnel costs paid

Breakdown of other personnel costs	thous. CZK	%
agreements on the performance of work	2 914	93.52
agreements on work activities	202	6.48
severance pay	0	0.00
Total	**3 116**	**100.00**

Number of employees

Number of employees as of 31.12.2022 (incl. unpaid, maternity, paternity leaves)	**575**
Number of employees as of 31.12.2022 (without unpaid, maternity, paternity leaves)	**536**
Average number of employees in 2022 (without unpaid, maternity, paternity leaves)	**479.61**
Sickness compensation paid from the IMG funds for the year 2022 in thous. CZK	**1 419.01**
Average wage for 2022	**47 346 CZK**

*) Data required under Section 21 of Act No. 563/1991 Coll., on Accounting, as amended.

10. PROVISION OF INFORMATION PURSUANT TO ACT NO. 106/1999 COLL., ON FREE ACCESS TO INFORMATION ACTIVITIES IN THE FIELD OF LABOUR-LAW RELATIONSHIPS **)

See Annex 3: Annual report of the IMG on the provision of information pursuant to Act No. 106/1999 Coll., on free access to information, as amended, for the period from January 1st to December 31st, 2022.

**) Information required under Section 18(2) of Act No. 106/1999 Coll., on free access to information, as amended.

stamp

Petr Dráber, DSc
Director
Institute of Molecular Genetics
of the Czech Academy of Sciences

Compiled on March 31st, 2023.

Attachments:

1) Organizational structure.

2) The audit report, which includes the financial statements.

3) Annual report of the IMG on the provision of information pursuant to Act No. 106/1999 Coll., on free access to information, as amended, for the period from January 1st to December 31st, 2022.