

## Public Lecture Evaluation

**Masaryk University**

**Faculty**

**Procedure field**

**Applicant**

**Lecture date**

**Lecture topic**

**Persons present**

(number)

**Designated evaluators**

(board members)

Faculty of Science

Genomics and Proteomics

RNDr. Martin Falk, Ph.D.

21th September. 2020

DNA damage response as a fundamental network of cell process enabling the life

36 (see attached list of attendees)

Prof. RNDr. Jiří Fajkus, CSc.

prof. MUDr. Leoš Navrátil, CSc., MBA

*CTU in Prague*

doc. Ing. Ivan Štekl, CSc.

*CTU in Prague*

Lecture by Dr. M. Falk in front of the professional public on the topic "DNA damage response as a fundamental network of cell process enabling the life" took place on September 21, 2010 from 2 pm in lecture room No. 205, pavilion A11, University Campus in Brno - Bohunice, Kamenice 5.

Dr. M. Falk organized his lecture into two main parts. In the first, he introduced the audience to DNA, the "basic molecule of life", and the permanent attacks on its integrity to which it is exposed as a result of environmental factors and intracellular processes. After overviewing various types of DNA damage and cellular systems for their repair, he focused on the mechanisms of formation and repair of double-strand breaks (DSBs), which represent the most serious type of DNA damage. He explained the general "strategy" of biochemical pathways for DSB repair, described in detail the mechanism of non-homologous end-joining (NHEJ) and homologous recombination (HR), and then discussed the advantages and disadvantages of these repair pathways from the points of view of their applicability, efficiency and fidelity. In summary, in this part of the lecture, M. Falk convincingly and in a comprehensible form illustrated the indispensability of DNA repair systems for cell's life, the necessity and complexity of their precise regulation, as well as their role in carcinogenesis and anticancer therapy.

The second part of the presentation focused on DNA damage by various types of ionizing radiation, which is the most effective inducer of DSBs, and therefore the "double-edged sword" with respect to cancer. The author first introduced radiobiology and its current challenges with regard to radiotherapy and space exploration. Consequently, through selected results of his own research, he pointed out on the important role of chromatin architecture in the processes of radiation damage and DNA repair, and proposed a new model of how chromatin architecture

affects the sensitivity of structurally and functionally distinct chromatin domains to sparse and densely ionizing radiation. This model was subsequently extended by the mechanism by which the local chromatin architecture at DSB sites contributes to the mechanism of chromosomal aberration formation, and an explanation of how this mechanism depends on the physical parameters of ionizing radiation. In the final passage, the author postulated the hypothesis that the architecture of chromatin is one of the critical factors in the regulation of repair pathways. He subsequently discussed this idea in the context of the latest results obtained using top-tech super-resolution microscopy techniques, in the frame of intensive international cooperation (KIP Heidelberg, Germany; JINR Dubna, Russia). The lecture emphasized not only the mechanistic issues of the studied cellular processes, but also their relationship to carcinogenesis and the possibilities of improving current radiotherapy and biodosimetry.

In his professional lecture, lasting 60 minutes, dr. Falk addressed a very topical and important area of cell biology and radiobiology, which is just undergoing rapid technological and intellectual development. In an engaging and widely understandable way, he acquainted the plenum with our knowledge in the field. The lecture was suitably divided into an overview introductory part and a "research" part, the basis of which was based mainly on the author's own research results and thus also demonstrated his long-term contribution to radiobiology. The lecture provoked an extensive discussion in which Dr. Falk answered the questions of the audience and the members of the committee in detail and to the general satisfaction. He thus proved his professional erudition and wide orientation in the field of DNA damage and repair and radiobiology in general. At the same time, Dr. Falk showed a certain talent to explain some complex phenomena in a relatively simple way.

### Questions

From the committee: Jiří Fajkus – Did you or anybody checked if the kinetics of repair is different between nucleoplasm and nuclei? Harry Scherthan – What is driving the movement of repair foci? H. Scherthan – How does the lesser 53BP1 correlate with less survival? I. Štekl – How is the DNA damage and repair affected in radiation-free environment? I. Štekl – Is DNA damage affected by the frozen state of cells.

Form the audience: - Are there differences in frequency of DNA mutations between people living under different natural irradiation background, say Iran and Europe? Does the DNA damage rate per cell correspond to non-irradiated cells? What is the main resource of DNA damage in non-irradiated cells?

The candidate has answered all questions from the committee members and the audience very satisfactorily and promptly.

### Conclusion

The lecture delivered by Martin Falk, entitled “DNA damage response as a fundamental network of cell process enabling the life” and delivered as part of the habilitation, *demonstrated* sufficient scholarly qualifications and pedagogical capabilities expected of applicants participating in a habilitation procedure in the field of Genomics and Proteomics.

Note: the evaluation text has been approved by all committee members.

In Brno on Sep 21, 2020

Prof. RNDr. Jiří Fajkus, CSc.

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signature

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