

**Recruitment for the Poznań Doctoral School of the Institutes of the Polish Academy of Sciences  
at the Institute of Bioorganic Chemistry, PAS in Poznan  
Procedure no. 32/2021/ICHB/PSD**

INSTITUTION: Institute of Bioorganic Chemistry, PAS  
CITY: Poznan  
POSITION: PhD student  
POSITIONS AVAILABLE: 1  
SCIENTIFIC DISCIPLINE: chemical sciences  
PUBLICATION DATE: 06.10.2021 r.  
APPLICATION DEADLINE: 05.11.2021 r.  
IBCH PAS WEBSITE: <http://www.ibch.poznan.pl>  
PDS IPAS WEBSITE: <http://www.psd-ipan.ibch.poznan.pl/>

**KEY WORDS:** chemical synthesis, CD, UV and NMR, spectroscopy, nucleic acids, cancer, inhibition of translation, quadruplexes, ligands

Research topic: "Anti-cancer strategy based on the induced G-quadruplex formation. Structural and biological properties of ligand-RNA/mRNA complexes."

Principal Investigator: dr Dorota Gudanis

### I. Project description

Ribonucleic acids are important therapeutic targets for cancer treatment. Knowledge of the sequence of the pathogenic gene is essential for the design of antisense oligonucleotides (ASOs) that bind specifically to the mRNA strand of the silenced gene. After hybridization of the ASO to the target mRNA, an ASO/mRNA duplex is formed that blocks access of ribosome to information encoded in mRNA. Thus, the expression of the undesired gene is inhibited. In the last decade, it has been shown that human mRNA contains many sequences rich in guanosine residues that in environments containing monovalent cations can fold into four-stranded structures called quadruplexes (G4). The main research objective of this project is to develop an anti-cancer strategy based on the induction of ASO/mRNA hybrid structures consisting of a quadruplex motif in addition to the duplex motif. To achieve this goal, chemically modified antisense RNA molecules with a covalently attached high-affinity G4-ligand will be synthesized. This approach should increase the biological and thermodynamic stability of the hybrid structures and the efficiency of this antisense tool. To test this strategy, well-established targets in anticancer therapy, mRNA fragments of epidermal growth factor receptor (EGFR) and bHLH transcription factor (c-MYC) will be used. The studies will be conducted in two directions. One part of these study will focused on chemical synthesis of new G4-ligands (carbazole and pyridine derivatives) and their covalent attachment to chemically modified antisense oligoribonucleotides. Structural characterization of the obtained hybrid structures will also be an important part of the research. The main experimental techniques that will be used at the initial stage of the project implementation will be solid-state synthesis of RNAs, NMR, CD and UV-Vis spectroscopy, affinity chromatography, fluorescence spectroscopy and electrophoretic techniques. At the same time, functional studies will be performed to test whether the designed antisense oligoribonucleotides have the ability to silence gene expression *in vitro*. The inhibition of translation driven by a formation of various ligand-ASO/mRNA complexes will be tested using a Renilla luciferase (RL) assay system. The RL activity will be quantified by a chemiluminescence. Finally, the selectivity of L-ASO binding to the mRNA will be analyzed through sequencing the transcriptome isolated from CRL5908 human cell lines expressing EGFR mRNA. If the planned studies are successful, antisense oligonucleotides based on quadruplex induction could be potentially important for the design of anticancer therapies.

### Additional information:

1. Research and doctoral theses shall be carried out within the project SONATA 16, no.2020/39/D/ST4/03177, entitled "Anti-cancer strategy based on the induced G-quadruplex formation. Structural and biological properties of ligand-RNA/mRNA complexes", funded by the National Science Centre.
2. PhD students shall receive a stipend in the gross amount of ca 4300 PLN (3800 PLN net), for the period of 33 months with possible extension
3. PhD students shall be subject to social insurance, pursuant to article. 6 section 1 passage 7b of the act of October 13th, 1998 on the social insurance system (Journal of Laws of 2019, item 300, 303 and 730).

## II. Requirements for the candidates:

1. A M.Sc. or equivalent experience in chemistry
2. University level knowledge of spectroscopic methods (NMR, UV) and organic chemistry, preferentially some experience in these fields
3. Ability to work independently, plan and conduct experiments, analyze results
4. Written and oral English proficiency
5. Motivation and a willingness to further scientific development, good communication skills and teamwork abilities

## III. Duties in the project:

1. The PhD student will be involved in both the chemical and spectroscopic branches of the project (emphasis may shift to one or the other depending on the student's background and proficiencies). Within the former branch his/her involvement will include performing ligand and RNA synthesis and purification (using a variety of methods including preparatory HPLC). Within the latter branch the PhD student will be involved in NMR spectra acquisition. The student will also apply complementary techniques, such as CD, UV spectroscopy or gel electrophoresis, when needed.
2. Participation in the preparation of publications.
3. Participation in experimental data storage and management.

## IV. Required documents:

1. Application for admission to PDS IPAS along with the consent for processing personal data upon the recruitment procedure and a statement on having acknowledged the regulations of recruitment for PDS IPAS, using form downloaded from [https://www.ibch.poznan.pl/uploads/studium%20doktoranckie/2019/ICHB%20-%20Application%20for%20admission%20\(2019-09\).docx](https://www.ibch.poznan.pl/uploads/studium%20doktoranckie/2019/ICHB%20-%20Application%20for%20admission%20(2019-09).docx)
2. Certified copy of the diploma confirming graduation or a certificate confirming graduation (in the case of diplomas issued by foreign higher education schools, diploma stipulated in article 326, section 2, passage 2 or article 327, passage 2 of the act of July 20th, 2018 – Law on Higher Education and Science (Journal of Laws of 2018, item 1668, as amended), entitling to apply for conferment of a doctoral degree in the state in where such a certificate was issued by the relevant higher education school. In the event when the candidate is not in possession of the aforementioned documents, he/she is obliged to submit them prior to admission to PDS IPAS. Additional information on foreign school diplomas are available at: <https://nawa.gov.pl/en/recognition/recognition-for-academic-purposes/applying-for-admission-to-doctoral-studies>
3. Scientific CV encompassing track record of previous education and employment, information on involvement in scientific activities (participation in student research groups, attendance at scientific conferences, accomplished internships and training, awarded prizes and distinction) and list of publications.
4. Cover letter featuring a short description of research interests, achievements and justification for the intention to commence education at the doctoral school.

5. Certificates or other documents confirming the degree of proficiency in English, if the candidate is in possession of such materials.
6. Contact details of at least one, previous scientific supervisor or another researcher who is entitled to issue an opinion on the candidate.

V. Applications should be submitted via the eRecruiter portal at

<https://system.erecruiter.pl/FormTemplates/RecruitmentForm.aspx?WebID=a0aa5820e897467fa6bec84c7c115ff1>

VI. Submission deadline is **05.11.2021**.

**VII. Criteria for evaluation of candidates:**

1. Candidate's research achievements, pursuant to the grades obtained in the course of studies, scientific publications, awarded scholarships and distinctions resulting from conducting scientific research or student activities or other achievements.
2. Candidate's scientific and professional experience, pursuant to participation in conferences, workshops, training sessions and internships, implementation of research and commercial projects, involvement in scientific trusts and societies, international and professional mobility, experience in other sectors, including industry.
3. Candidate's knowledge on the following discipline: chemical sciences.
4. Knowledge of the subject matter described in the recruitment advertisement.

VIII. The recruitment procedure shall be concluded no later than **30.11.2021**.

IX. The description of the recruitment process is stipulated in the Regulations of Recruitment for PDS IPAS. Following the recruitment procedure, the unadmitted candidates shall be informed on the number of points obtained at both stages.

Incomplete applications will not be considered.

For additional information please contact the Principal Investigator:

dr Dorota Gudanis

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**Information clause:**

*Pursuant to the stipulations of the regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), further referred to as GDPR, we hereby inform that:*

- *The Institute of Bioorganic Chemistry, Polish Academy of Sciences, seated in Noskowskiego St. 12/14, 61-704 Poznan; REGON 000849327, NIP 777-00-02-062 is the administrator of the collected personal data (further referred to as the Institute).*
- *The Administrator appointed a Data Protection Officer, who can be contacted in writing, via traditional mail, by sending a letter to the following address: Z. Noskowskiego St. 12/14, 61-704 Poznan, or by sending an e-mail to: [dpo@ibch.poznan.pl](mailto:dpo@ibch.poznan.pl).*
- *The personal data of the candidates is processed for the purposes of fulfilling the tasks of the administrator, associated with conducting the recruitment procedure for a vacant position.*

- *The legal basis for processing personal data is the Act of 26 June 1974 – The Labor Code, Act of 30 April 2010 on the Polish Academy of Sciences or the consent of the person whose data shall be subjected to processing.*
- *Your personal data shall be subjected to processing for period of 3 months upon the date of decision of the recruitment committee. Following this period, the data will be irretrievably and effectively destroyed.*
- *The personal data of the candidates shall not be transferred to any third country.*
- *The person whose data shall be subjected to processing has the right to:*
  - *request access to his/her personal data, and to amend it or delete it, pursuant to articles 15-17 of GDPR;*
  - *limit data processing, in the events stipulated in article 18 of GDPR;*
  - *data transferring, pursuant to article 20 of GDPR;*
  - *withdraw consent at any moment, without influencing compliance with the law of the processing that was executed prior to consent withdrawal;*
  - *file a complaint to the Inspector General for Personal Data Protection.*

*Providing personal data in the scope stipulated in article 22 (1) of the Act of 26 June 1974 – The Labor Code is mandatory, whereas providing data in a broader scope is voluntary and requires consent for its processing.*

