

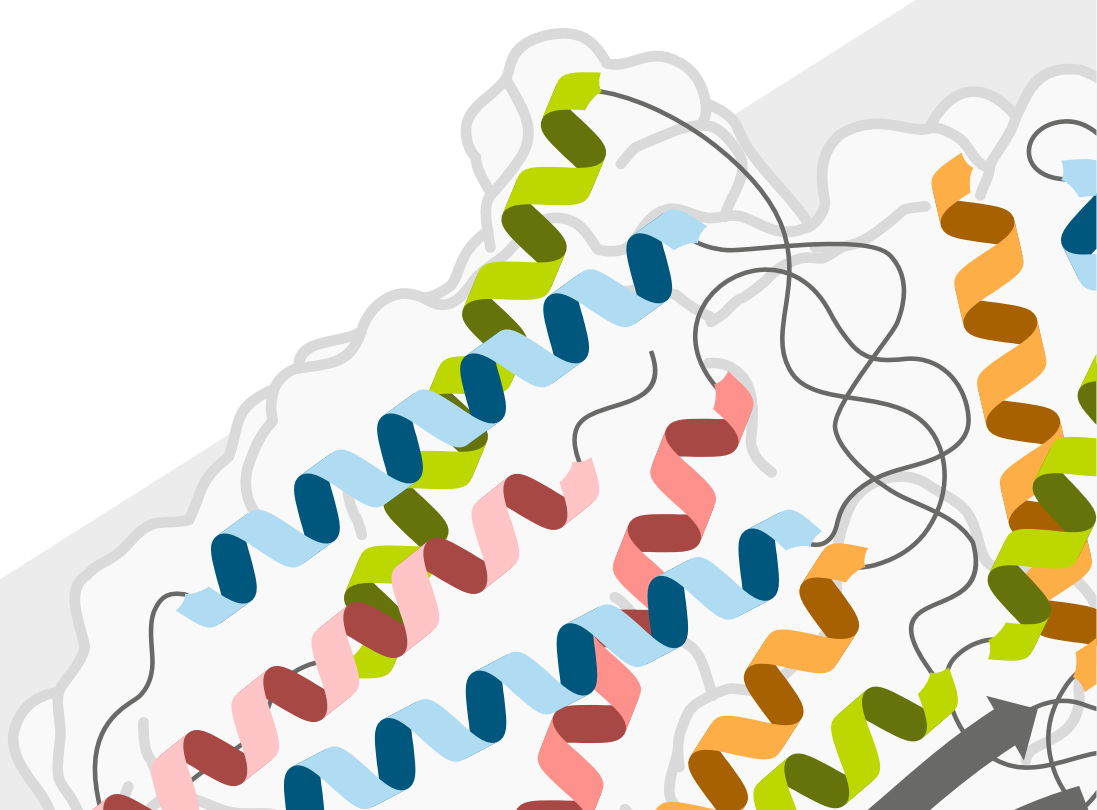
BOOK OF ABSTRACTS

The 8th International Conference on

CHEMISTRY, STRUCTURE AND FUNCTION OF BIOMOLECULES

Minsk, Belarus

1-5 October 2024





NATIONAL ACADEMY OF SCIENCES OF BELARUS
THE DEPARTMENT OF CHEMISTRY AND EARTH SCIENCES



INSTITUTE OF BIOORGANIC CHEMISTRY

THE 8TH INTERNATIONAL CONFERENCE ON
**CHEMISTRY, STRUCTURE AND
FUNCTION OF BIOMOLECULES**

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The present book contains abstracts of the 8th International Conference on **Chemistry, Structure and Function of Biomolecules**, which was held in Minsk, Belarus, on October 1-5, 2024. The Conference materials cover a wide spectrum of scientific problems connected with isolation from nature sources and structure elucidation, chemical synthesis and biosynthesis, study of biological activity, bioengineering and bioinformatics and practical applications of bioregulators and biopolymers. The abstract book contains abstracts as provided by their authors except for minor editing for consistency in style.

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CONTENTS

Plenary Lectures.....	5
Oral Session 1 <i>Chemo- and Bioinformatics</i>	25
Oral Session 2 <i>Chemo- and Bioinformatics</i>	33
Oral Session 3 <i>Bioorganic Chemistry</i>	43
Oral Session 4 <i>Structural Biology</i>	53
Oral Session 5 <i>Bioorganic Chemistry</i>	57
Oral Session 6 <i>Bioorganic Chemistry</i>	65
Oral Session 7 <i>Organic Chemistry</i>	75
Oral Session 8 <i>Organic Chemistry</i>	85
Oral Session 9 <i>Pharmacology and Toxicology</i>	91
Oral Session 10 <i>Biochemistry</i>	101
Poster Session 1 <i>Bioorganic Chemistry</i>	111
Poster Session 1 <i>Chemo- and Bioinformatics</i>	143
Poster Session 1 <i>Pharmacology and Toxicology</i>	151
Poster Session 2 <i>Biochemistry</i>	163
Poster Session 2 <i>Organic Chemistry</i>	189
Author Index.....	216

NOVEL METABOLIC REGULATION STRATEGY FOR TRIPLE-NEGATIVE BREAST CANCER TREATMENT: DEVELOPMENT AND APPLICATION OF AP@ZIF-MEM NANOSYSTEM

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Triple-negative breast cancer (TNBC) is characterized by aggressive growth and poor prognosis. To meet the rapid proliferation needs, TNBC cells primarily rely on glycolysis for energy production, resulting in excessive lactic acid generation. This creates an acidic tumor microenvironment that promotes angiogenesis, metastasis, and immune evasion⁽¹⁾.

Here, we developed macrophage-membrane-coated metal-organic framework nanoparticles (AP@ZIF-Mem) to deliver atorvastatin (an MCT4 inhibitor)⁽²⁾ and polydatin (a G6PD inhibitor)⁽³⁾ for interfering with glucose metabolism in TNBC treatment. AP@ZIF-Mem exhibited excellent tumor targeting and accumulation through macrophage-biomimetic behavior. The nanoparticles induced intratumoral acidosis by inhibiting lactic acid efflux and increased intracellular reactive oxygen species (ROS) by suppressing G6PD function. This dual-pronged approach disrupted tumor energy supply and redox homeostasis, effectively inhibiting tumor growth and metastasis.

Moreover, AP@ZIF-Mem reprogrammed the immunosuppressive microenvironment by promoting macrophage polarization from M2 to M1 phenotype. *In vivo* studies demonstrated that AP@ZIF-Mem significantly suppressed tumor growth and lung metastasis in 4T1 tumor-bearing mice.

This study provides a novel strategy for TNBC treatment by modulating glucose metabolism, offering potential as an adjuvant therapy for various cancer treatments.

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AUTHOR INDEX

A

Abashkin, Viktor • 98
Abduazimova, Dildora • 122
Abdullaeva, Muyassarkhon • 123
Abdurakhmanov, Jaloliddin • 201
Akhmedov, Alan • 87
Akhremchuk, Artur • 176
Akhremchuk, Katsiaryna • 50
Aldekeeva, Anna • 56
Aleksandrova, Anna • 109
Alekseev, Yakov • 56
An, Linna • 15
Andreev, Michail • 178
Andreev, Yaroslav • 60, 97
Andrianov, Alexander • 29, 30,
32, 37, 148, 149
Andronova, Veranika • 23
Andronova, Valeria • 201
Anishchenko, Ivan • 15
Anohova, Veronika • 20
Antipova, Olga • 100
Antonchick, Andrey • 17
Aripov, Takhir • 122, 123
Arnautova, Alexandra • 121, 141
Azimova, Shakhnoz • 201

B

Baker, David • 15
Baranovsky, Alexander • 81, 126,
136, 211
Barashkova, Anna • 61
Basina, Viktoriia • 186
Bei, Maksim • 199
Beldiia, Evgenia • 173, 181, 182
Belko, Alla • 162
Belonovskaya, Elena • 184
Belov, Dmitrii • 56
Belov, Yuri • 56
Belova, Vlada • 49, 127
Bely, Pavel • 178
Berdieva, Khabiba • 138
Bershitsky, Sergey • 173, 181, 182
Berzina, Maria • 47, 69
Birycheuskaya, Larisa • 174, 177
Bizunok, Natalia • 158
Boboriko, Natallia • 124
Bocharov, Eduard • 48
Bogdanov, Fedor • 208, 215
Bogdanović, Milica • 130
Borišev, Ivana • 130
Borodina, Tatyana • 184
Borshchevsky, Valentin • 23
Bozhok, Tatyana • 162
Bozin, Timur • 48
Brovka, Andrey • 178
Brovka, Gennadiy • 178
Bugaenko, Dmitry • 209
Bukhlitskaya, Irina • 159
Bulatovski, Aleksey • 131
Butko, Katsiaryna • 200
Butova, Xenia • 185

C

Charnou, Yuri • 81
Chashchina, Natalia • 161, 206
Cheholsky, Anatoliy • 156
Chen, Xiandan • 105
Chen, Yu-xiang • 29
Chernysheva, Anastasia • 109
Chingizova, Ekaterina • 96
Chukarina, Tatyana • 208
Chupakhin, Evgeniy • 20
Chuvashov, Danil • 107

D

Danilova, Elena • 126
Dar'in, Dmitry • 20
Dauparas, Justas • 15
Denisiuk, Daria • 134
Dikmen, Zeliha • 174
DiMaio, Frank • 15
Dobrilko, Victoria • 200
Dolgaya, Stefania • 106
Dolgopalets, Vladimir • 136
Dormeshkin, Dmitri • 23
Doronkina, Anastasia • 100
Dubinnyi, Maxim • 47
Dubovik, Boris • 158
Dubovskaya, Ludmila • 175
Dyachenko, Igor • 97
Dzantiev, Boris • 71
Dzichenka Yaraslau • 19, 41, 124,
125, 178

E

Efimova, Anna • 63
Efimova, Marina • 126
Efimova, Alexandra • 141
Efremenko, Anastasiya • 88
Eletskaia, Barbara • 69
Ermolinskaya, Anastasiya • 30,
148
Erokhin, Pavel • 214
Esanov, Rakhmat • 136
Esipov, Roman • 201
Evdokimova, Olesia • 176

F

Faryna, Aliaksandr • 162
Fateev, Ilya • 201
Fatykhava, Sviatlana • 136, 160
Fedorov, Yuri • 88
Fedorova, Olga • 63, 88
Feofanov, Alexey • 88
Filshtein, Alina • 127
Frolova, Valeriya • 201
Furs, Konstantin • 32, 37

G

Galynskaya, Ulyana • 125
Garbuz, Olga • 128
Gavrilchik, Alina • 100
Gayibov, Ulugbek • 122, 123
Gayibova, Sabina • 122, 123, 138
Gerlovsky, Denis • 51
Giginiak, Yuriy • 178
Gilep, Andrei • 186
Gilevich, Syargey • 41, 132
Gnedenko, Oksana • 186
Golovanov, Ivan • 18
Golyakovich, Anna • 162
Gonchar, Anna • 32, 37
Goretsky, Dmitry • 147, 178
Grabovec, Irina • 109, 186
Graur, Ianina • 128
Graur, Vasilii • 128
Gribovskaya, Olga • 129
Grischenko, Elena • 147, 178
Gromov, Ivan • 79
Gryaznov, Sergei • 174, 177
Guangfeng, Zhou • 15
Gulea, Aurelian • 128

H

Harbachova, Iryna • 139
Hubich, Aksana • 157

I

Ignatovich, Zhanna • 30, 148
Ivanov, Alexis • 186
Ivashkevich, Oleg • 98

J

Jiang, Shibo • 37
Jiao, Fanke • 37
Jovanović-Šanta Suzana • 14, 125

K

Kalinichenko, Elena • 162
Kalinin, Eugeny • 107
Kalvet, Indrek • 15
Kamionskaya, Maria • 107
Kananovich, Yana • 164, 174,
177
Kandelinskaya, Olga • 147, 178
Kantin, Grigory • 20
Kapranov, Ivan • 23
Karankevich, Elena • 159
Karchava, Alexander • 209
Kasatsky, Pavel • 55
Kasich, Anton • 203
Kayumov, Muzaffar • 133
Kayushin, Alexey • 62, 64
Kazlova, Volha • 160, 161
Khancheuski, Maksim • 131
Khasanov, Timur • 60, 97
Khlebnicova, Tatyana • 204

Khokhlova, Anastasia • 185
 Kholbekov, Omonkul • 72
 Khripach, Vladimir • 21, 109
 Kinzhalov, Mikhail • 98
 Kipnis, Yakov • 15
 Kiseleva, Elena • 179, 180
 Klimovich, Anna • 96
 Kochurova, Anastasia • 173, 181, 182, 185
 Kokoulin, Maksim • 49, 127
 Kolomeichuk, Liliya • 126
 Konevega, Andrey • 55
 Konoreva, Ludmila • 178
 Konstantinov, Frants • 31
 Konstantinova, Irina • 47, 62, 64, 69, 141, 201
 Kopylova, Galina • 173, 181, 182, 185
 Kornoushenko, Yury • 30, 147, 148
 Koroleva, Elena • 30, 148
 Kostić, Marijana • 130
 Kou, Longfa • 105
 Kozlov, Sergey • 97
 Kozlovich, Darya • 131
 Kravchenko, Elena • 158, 159
 Krishna, Rohith • 15
 Kudra, Natalya • 156
 Kuleshov, Denis • 79
 Kulsha, Andrey • 98
 Kuprienko, Olga • 139, 183
 Kupryushkin, Maxim • 108
 Kurbatova, Lubov • 178
 Kurman, Peter • 81
 Kuvaeva, Zoya • 159
 Kuzmenka, Sofiya • 41, 132
 Kuzmich, Aleksandra • 49
 Kuzmitskaya, Irina • 184
 Kuznetsov, Vladimir • 126

L

Lagunova, Olga • 20
 Lauko, Anna • 15
 Lakhvich, Fedor • 83, 204, 207, 208, 213
 Lamkina, Yuliya • 209
 Laptsevich, Valeryia • 208
 Laykov, Yan • 149
 Leanavets, Hanna • 125
 Lebedev, Albert • 79
 Lee, Gyu Rie • 15
 Leonkov, Danila • 205
 Leovac, Vukadin • 130
 Leuchanka, Nikita • 161
 Linnik, Vladislav • 207
 Lisouskaya Maryna • 99, 133
 Litvinko, Natalia • 51
 Litvinovskaya, Raisa • 126, 134
 Liu, Yulong • 80
 Logvinenko, Nikita • 82
 Lu, Lu • 37
 Lugovsky, Alexander • 203
 Lugovsky, Anatoly • 203
 Lyu, Liang-Dong • 32

M

Malikova, Durдона • 138
 Mallphanov, Ilya • 20
 Markov, Andrey • 108
 Martinovich, Vera • 129
 Maslov, Mikhail • 108
 Matchanov, Alimjon • 136
 Matorin, Alexey • 206
 Matusevich, Pavel • 178
 Matyushenko, Alexander • 181, 182
 Mazur, Dmitrii • 79
 Mekhtiev, Arif • 109
 Meleshko, Alexander • 24
 Menchinskaya, Ekaterina • 96
 Mezentsev, Yuri • 186
 Mikhailopulo, Igor • 13
 Mikhailopulo, Konstantin • 179, 180
 Mikhal'chuk Alexander • 70, 99, 133, 137
 Mikhailiov, Artem • 203
 Mikhaylova, Alexandra • 208
 Mineev, Konstantin • 97
 Minofar, Babak • 12
 Mironov, Anton • 69
 Miroshnichenko, Svetlana • 108
 Miroshnikov, Anatoly • 64, 69, 201
 Moroz, Valentina • 184
 Morozov, Roman • 56
 Murgan, Olga • 126
 Muškinja, Jovana • 213
 Myachina, Tatiana • 185

N

Nadolnik, Liliya • 184
 Nasyrova, Galiya • 122
 Novoselov, Matvey • 206
 Novozhilova, Maria • 200
 Ogurtsova, Svetlana • 83, 208
 Olgomets, Lyubov • 158, 159
 Onuchina, Alexandra • 79
 Osmakov, Dmitry • 60, 97
 Ostrovsky, Alexander • 184

P

Pakhomov, Alexey • 63
 Paleskava, Alena • 55
 Palukoshka, Alena • 99
 Pan, Zhang • 11, 204
 Panchenko, Pavel • 88
 Panibrat, Olesya • 30, 148, 160, 161, 162, 200, 211
 Panina, Yulia • 87
 Panova, Elizaveta • 38
 Paramonov, Alexander • 47
 Parkhomenko, Vladislav • 203
 Pashkovsky, Felix • 207
 Patutina, Olga • 108
 Paulovich, Dzmitry • 83
 Pellock, Samuel J. • 15
 Perakhod, Dzmitry • 134

Perakhod, Ryhor • 134
 Pichkur, Evgeniy • 55
 Pikovskoi, Ilya • 79
 Pinchuk, Polina • 150
 Pisyagin, Eugeny • 96
 Piven, Yuri • 83, 208, 215
 Polubok, Vyacheslav • 184
 Polyakova, Anna • 88
 Pospelov, Evgeny • 89
 Potkin, Vladimir • 30

R

Radanović, Mirjana • 130
 Ranishenka, Bahdan • 209
 Rasich, Valeryia • 51
 Ripinskaya, Kristina • 178
 Rogozhin, Eugene • 48, 61
 Romanchuk, Anna • 184
 Romanenko, Lyudmila • 49
 Rubinov, Dmitry • 204, 207, 208
 Rudak, Angelina • 100

S

Sabirova, Mamura • 122
 Sachanka, Antos • 106
 Safenkova, Irina • 71
 Safin, Damir • 38
 Salnikova, Diana • 200, 215
 Sasmakov, Sobirdjan • 201
 Sauchuk (Savchuk), Alina • 126, 134, 160
 Savanets, Oksana • 158, 159
 Schastnay, Nadezhda • 100
 Scherbakov, Alexander • 19, 109, 200, 208, 215
 Scherbakov, Kirill • 109
 Semakin, Artem • 18
 Semenov, Dmitry • 139
 Serchenya, Tatyana • 50, 71
 Serebryanskaya, Tatiyana • 98
 Seviarynchyk, Tatsiana • 135, 209
 Shabunya, Polina • 136, 160, 186
 Shakirzyanova, Gulnara • 72
 Shaladonova, Marina • 39
 Shapiro, Michail • 23
 Shcharbin, Dzmitry • 123
 Shchepkin, Daniil • 173, 181, 182, 185
 Shchur, Veronika • 16, 106, 140
 Shelukho, Evgeniya • 82, 214
 Shepialevich, Siarhei • 81, 210
 Shirochina, Irina • 175
 Shitova, Polina • 49, 127
 Shmanai, Vadim • 135, 209
 Sholuch, Michail • 178
 Shpak, Anton • 157
 Shulenina, Olga • 55
 Silchenko, Alexandra • 96
 Simonova, Raisa • 185
 Sinyutich, Yulia • 148
 Sivets, Grigorii • 22, 131
 Smirnova, Olga • 68, 69, 73

Šmit, Biljana • 213
Sokolov, Sergey • 211
Sonich, Anastasiya • 41, 132
Sorokin, Danila • 109
Sorokina, Liubov • 110
Stakhanova, Anna • 212
Stanić, Petar • 213
Stoikov, Ivan • 87
Sukhorukov, Alexey • 18, 89
Sun, Yao • 11
Sviridov, Oleg • 139, 175, 179,
180, 183
Sysa, Aliaksei • 105

T

Taran, Ilya • 127
Terpinskaya, Tatiana • 99
Timchenko, Violetta • 137
Titovets, Ernst • 40
Togaev, Ulugbek • 72
Tolstyko, Evgeniy • 55
Tryfanava, Alina • 160, 161
Tsapkov, Victor • 128
Tsybruk, Tatsiana • 109, 186
Tumanov, Alexander • 184
Tumilovich, Anastasiya • 186
Tuzikov, Alexander • 29, 32, 37,
149

U

Umarova, Fatima • 138
Uranskaya, Keira • 69
Urazova, Malika • 122
Urban, Viktor • 31
Usanov, Sergei • 16, 39, 106, 113
Ustimova, Maria (Mariya) • 63,
88

V

Valentovich, Leonid • 50, 176
Varabyeva, Nastassia • 83
Vashkevich, Irina • 98, 139, 183
Veresov, Valery • 31
Vinnikova, Oksana • 139
Vinter, Marharyta • 174, 187
Virijević, Katarina • 213
Volkova, Yulia • 19
Voronov, Ilya • 79
Voskresenskaya, Olga • 212

W

Wang, Lijue • 37
Wang, Qian • 37
Wang, Yixin • 32
Wen, Yu • 202

X

Xia, Shuai • 37
Xu, Wei • 37

Y

Yablokov, Evgeniy • 186
Yakovleva, Elizaveta • 82, 214
Yanchanka, Tatiana • 99
Yanchanka, Vladimir • 129
Yanchuk, Anna • 140
Yantsevich Aleksei • 16, 106,
140, 178
Ye, Fei • 11, 80, 202, 204
Ying, Fu • 11, 80, 202, 204
Yuldashev, Khabibulla • 133
Yurchenko, Ekaterina • 96
Yuvchenko, Anatolij • 199

Z

Zavarzin, Igor • 19
Zavialova, Maria • 109
Zaytsev, Vladimir • 82, 214
Zenkova, Marina • 108
Zhabinskii, Vladimir • 21, 109,
126, 160, 161, 200, 206
Zhavoronok, Irina • 100
Zherdev, Anatoly • 71
Zhmurov, Pert • 18
Zhogla, Victoriya • 98
Zilberman, Anna • 183
Zilberman, Roman • 159
Zinchenko, Anatoly (Anatolii) •
131, 174, 177, 187
Zinovich, Veronica • 208, 215
Ziyaev, Abdulkhakim • 201
Zlobin, Ilya • 126
Zorina, Ekaterina • 141
Zuraev, Alexander • 205

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