SECONDARY METABOLITES OF THE MICROORGANISMS ASSOCIATED WITH MEDICINAL PLANTS AS A SOURCE OF ANTIMICROBIAL COMPOUNDS

Eshboev F.B*., Bobakulov Kh.M., Abdurakhmanov J.M., Dolimov Kh.Kh., Abdurashidov A.A., Sasmakov S.A., and Azimova Sh.Sh.

S.Yu. Yunusov Institute of the Chemistry of Plant Substances, Academy of Sciences of the Republic of Uzbekistan, 77, Mirzo Ulugbek Str., 100170, Tashkent, Uzbekistan
Correspondence: farkhod.eshboev@gmail.com

Antibiotic resistance is an important issue due to the frequent use of antibiotics for treatment common bacterial infections, indicating that we are running out of effective antibiotics. According to the World Health Organization, antimicrobial resistance has emerged as one of the most serious public health concerns of the 21st century [1]. Approximately 4.95 million deaths per annum worldwide occur as a result of antibiotic-resistant pathogens [2]. In such situation discovering new natural bioactive compounds, especially from endophytes, that may serve as alternative agents to combat antibiotic-resistant pathogens and cancer [3,4]. Endophytes are the microorganisms that exist inside the plant tissues without having any negative impact on the host plant. Endophytic fungi have gained tremendous attention due to their ability to produce novel bioactive compounds exhibiting varied biological properties and are, therefore, utilized for medicinal, pharmaceutical, and agricultural applications. For instance, penicillin produced by *Penicillium chrysogenum*, which was a milestone in the development of antibiotic drugs, as a “front-line” antibiotic which saved millions of lives; hence, it was referred to as “wonder drug” [5]. Therefore, in this study we studied the antimicrobial activities of the secondary metabolites of fungi associated with medicinal plant *Hyssopus officinalis*. First of all, we isolated 9 fungal isolates from this plant and cultivated them in potato broth medium then extracted with ethyl acetate(EtOAc). After that antimicrobial activities of the crude extracts of the obtained endophytic fungi were conducted by disk-diffusion method. According to the results of antimicrobial activities, EtOAc extracts of isolate 1, 2, 4, 6, 8 and 9 showed appreciable antibacterial activities against tested bacterial strains. The extracts of the isolate 3 and 7 manifested pronounced and strong antibacterial effects against the bacterial strains. After antimicrobial activities, we cultivated isolate 7 in large scale for isolation and identification of active compound. As a result, we isolated and structure identified the antimicrobial active compound as a penicillic acid and antimicrobial activities of the isolated compound were greater than reference antibiotic gentamicin against Gramm-negative bacteria.

Literature

1. World Health Organization (WHO). Antimicrobial Resistance: Global Report on Surveillance; WHO: Geneva, Switzerland, 2020.

2. Prestinaci, F.; Pezzotti, P.; Pantosti, A. Antimicrobial resistance: A global multifaceted phenomenon. Pathog. Glob. Health 2015, 109, 309–318.

3. Peng, C.; Xu, J.; Yu, M.; Ning, X.; Huang, Y.; Du, B.; Hernandez, E.; Kapur, P.; Hsieh, J.T.; Zheng, J. Tuning the in-Vivo Transport of Anticancer Drugs Using Renal-Clearable Gold Nanoparticles. Angew. Chem. 2019, 131, 8567–8571.

4. Ferlay J, Ervik M, Lam F, Colombet M, Mery L, Piñeros M, et al. Global Cancer Observatory: Cancer Today. Lyon: International Agency for Research on Cancer; 2020 (https://gco.iarc.fr/today, accessed February 2021).

5. Tan, S.Y.; Tatsumura, Y. Alexander Fleming (1881–1955): Discoverer of penicillin. Singap. Med. J. 2015, 56, 366–367.

МАГНИТНЫЕ МОЛЕКУЛЯРНО-ИМПРИНТИРОВАННЫЕ ПОЛИМЕРЫ НА ОСНОВЕ ГУМИНОВОЙ КИСЛОТЫ

Жакина А.Х., Арнт О.В., Альжанкызы А. Мулдахметов З.М.
ТОО «Институт органического синтеза и углехимии РК»

В настоящее время интенсивное развитие промышленного производства и широкое использование химикатов в различных областях деятельности человека сопровождаются глобальным загрязнением воды и почвы различными токсичными веществами. В последнее десятилетие со стороны исследователей проявляется большой интерес к новому классу синтетических материалов, обладающих способностью к распознаванию и селективной избирательностью по отношению к определенным соединениям. Данные материалы получают с помощью метода MolecularImprinting.

Природные высокомолекулярные полимерные сорбенты, распознающие целевые молекулы или ионы, привлекают особое внимание [1-2]. Однако, из-за присущего им существенного недостатка – замедленной скорости сорбции, такие полимерные сорбенты пока не получили широкого практического применения, хотя область их потенциального применения чрезвычайно широка [3-5].

Ранее нами [6] с использованием метода MolecularImprinting были созданы импринтированные полимеры на основе аминогуминовых кислот, с внедрением многостенных углеродных нанотрубок, предварительно настроенные на ион меди. Привлекательность полученных импринтированных полимеров для практического использования обусловлена такими свойствами, как простота получения, высокая стабильность, селективность связывания целевых металлов.