THE 67TH INTERNATIONAL

# OPEN READINGS

CONFERENCE FOR STUDENTS OF PHYSICS AND NATURAL SCIENCES

# BOOK OF ABSTRACTS | 2024

Vilnius University

VILNIUS UNIVERSITY PRESS

Editors:

Martynas Keršys
Rimantas Naina
Vincentas Adomaitis
Emilijus Maskvytis

Cover and Interior Design:

Goda Grybauskaitė

Vilnius University Press
9 Saulėtekio Av., III Building, LT-10222 Vilnius
info@leidykla.vu.lt, www.leidykla.vu.lt/en/
www.knygynas.vu.lt, www.journals.vu.lt

Bibliographic information is available
on the Lithuanian Integral Library Information System (LIBIS) portal www.ibiblioteka.lt
ISBN 978-609-07-1051-7 (PDF)

# SYNTHESIS OF 3-(24-DIHIDROXY-5-BENZYL)ALKYL CARBOXYLIC ACIDS AND THEIR DERIVATIVES

Vilius Petraška[1], Ieva Žutautė[1], Algirdas Brukštus[1]

[1]Vilnius University
vilius.petraska@chgf.vu.lt

HSP90 (Heat Shock Protein 90) is a chaperone protein that belongs to the heat shock protein class and has a mass roughly equal to 90 kDa. The protein is found in most animal kingdoms and accounts for 1-2% of all proteins located inside human cells. The chaperone is responsible for proper protein folding, their stabilization during heat stress conditions and assistance during degradation [1]. Cancer cells contain elevated levels of HSP90, which is vital to their migration, metastasis, proliferation and other processes occurring during tumor growth [2]. According to the data presented by the World Health Organization in 2022, cancer is a leading case of deaths globally, responsible for around 10 million deaths annually [3]. Consequently, HSP90 has been subject to numerous studies over the last decade as a potential target for anti-cancer and anti-neurodegenerative medications [2].

The studies of radicicol (a natural product that binds competitively to HSP90) have shown that a resorcinol fragment with its hydroxy groups is crucial to the inhibition of the N-terminal domain, which contains the preeminent region of the protein — the ATP binding pocket [4]. Further studies revealed that for a drug molecule to bind effectively to the active site of the protein, it needs to contain an aromatic ring situated near the resorcinol moiety [5].

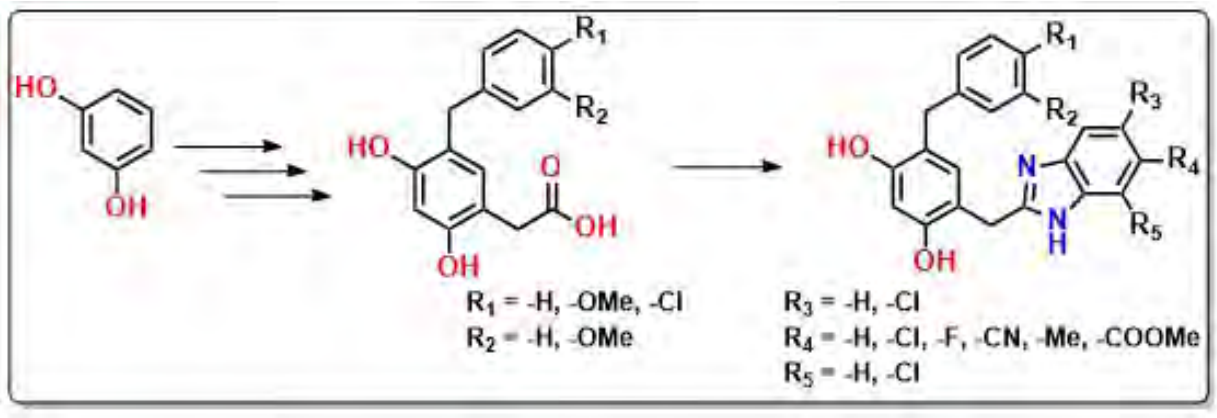


**Fig. 1.** Synthesis of benzimidazoles using resorcinol as a starting compound

The objective of this work is to synthesize various 3-(2,4-dihidroxy-5-benzyl)alkyl carboxylic acids and use them in the synthesis of potential resorcinol-based HSP90 inhibitors containing a benzimidazole moiety. The ten-step synthesis, it's challenges and results as well as more details about HSP90 will be discussed during the presentation.

**Acknowledgement:** This research was funded by the Research Council of Lithuaina (project no. P-ST-23-151).

[1] Tsutsumi, S. et al. Charged linker sequence modulates eukaryotic heat shock protein 90 (Hsp90) chaperone activity. PNAS , 109(8), 2937 (2012).
[2] Neckers, L., Neckers, K. Heat-shock protein 90 inhibitors as novel cancer chemotherapeutics an update. Expert Opinion on Emerging Drugs, 10(1), 137 (2005).
[3] World Health Organization (2022, February 3). Cancer.
[4] Schulte, T. W. et al. Interaction of radicicol with members of the heat shock protein 90 family of molecular chaperones. Molecular Endocrinology (Baltimore, Md.), 13(9), 1435 (1999).
[5] Ardestani, M. et al. Heterocyclic Compounds as Hsp90 Inhibitors: A Perspective on Anticancer Applications. Pharmaceutics, 14(10) (2022).