medical sciences forum

MDPI

Abstract

New *N*-Benzenesulfonylguanidine Derivatives and Their Selective Growth Inhibition of Human Breast Cancer Cell Line MCF-7 and Colon Carcinoma HCT-116 †

Aneta Pogorzelska [1,*], Jarosław Sławiński [1] and Anna Kawiak [2]

[1] Department of Organic Chemistry, Medical University of Gdansk, 80-416 Gdansk, Poland
[2] Department of Biotechnology, Intercollegiate Faculty of Biotechnology UG-MUG, 80-307 Gdansk, Poland
* Correspondence: anetapogorzelska@gumed.edu.pl
† Presented at the 8th International Electronic Conference on Medicinal Chemistry, 1–30 November 2022; Available online: https://ecmc2022.sciforum.net/.

Abstract: Our previous research proved that benzenesulfonylguanidine derivatives display significant cytotoxic activity against human cancer cells. Here, we describe new 1-(2-alkylthio-4-chloro-5-methylbenzenesulfonyl)guanidines with cytotoxic activity against HCT-116 and MCF-7 cells. The planned derivatives were obtained by a two-step synthesis. The starting substrates were 1-(2-alkylthio-4-chloro-5-methyl)benzenesulfonyl)-3-aminoguanidines **1–4,** which were transformed into 1-(2-alkylthio-4-chloro-5-methylbenzenesulfonyl)-3-[(2-chloroacetyl)amino]guanidines **5–8** by a reaction with chloroacetyl chloride. In the next step, the derivatives **5–8** were reacted with potassium thiocyanate, yielding 1-(2-alkylthio-4-chloro-5-methylbenzenesulfonyl)-3-(2-imino-4-oxothiazolidine-3-yl)guanidines **9–12**. The synthesized derivatives **5–12** were evaluated in vitro by MTT assays for their activity against three human cancer cell lines: colon cancer HCT-116, breast cancer MCF-7, and cervical cancer HeLa. The activity against non-cancerous human epidermal keratinocyte line HaCaT was also examined. The data indicate that compounds **5–8** inhibit the growth of cancer cells more strongly than derivatives **9–12**. The selective cytotoxic effect against HCT-116 cells was found for benzenesulfonylguanidine **6** containing a 2-(trifluoromethyl)benzylthio group at position two of the benzenesulfonyl scaffold. The IC_{50} value was 13 μM, while IC_{50} for HaCaT cells, it was 48 μM. Good selectivity was also observed for compound **7**, with a 2-chloromethylbenzylthio substituent, against HCT-116 and MCF-7 cells (IC_{50} = 12 and 19 μM, respectively, for HCT-116 and MCF-7 cells, IC_{50} = 47 μM for HaCaT cells). Among compounds **9–12**, only compound **9** showed moderate but selective cytotoxicity against MCF-7 cells, with IC_{50} = 18 μM compared with IC_{50} = 54 μM for HaCaT cells.

Keywords: sulfonamides; benzenesulfonylguanidines; cytotoxic activity; anticancer

Citation: Pogorzelska, A.; Sławiński, J.; Kawiak, A. New *N*-Benzenesulfonylguanidine Derivatives and Their Selective Growth Inhibition of Human Breast Cancer Cell Line MCF-7 and Colon Carcinoma HCT-116. *Med. Sci. Forum* **2022**, *14*, 49. https://doi.org/10.3390/ECMC2022-13281

Academic Editor: Alfredo Berzal-Herranz

Published: 1 November 2022

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/ECMC2022-13281/s1.

Author Contributions: Conceptualization, A.P. and J.S.; methodology, A.P. and A.K.; formal analysis, A.P.; investigation, A.P. and A.K.; writing—original draft preparation, A.P.; writing—review and editing, J.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Data supporting reported results are available from the authors.

Conflicts of Interest: The authors declare no conflict of interest.