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THE SYNTHESIS OF ω-(7-ARYL-8-OXO-7,8-DIHYDRO[1,2,4]-TRIAZOLO-[4,3-*a*]PYRAZIN-3-YL)ALKYLCARBOXYLIC ACIDS AND THEIR AMIDES AS PROMISING PHARMACEUTICAL AGENTS

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A comfortable and effective synthetic scheme for 3,7-disubstituted [1,2,4]triazolo[4,3-a]pyrazin-8(7H)-ones previously designed was distributed to derivatives of ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4] triazolo[4,3-a]pyrazin-3-yl) alkylcarboxylic acids. Our approach consists of application of the reaction of 3-hydrazinopyrazin-2-ones previously described with cyclic anhydrides of dicarbonic acids, such as succinic and glutaric anhydrides. Subsequent cyclization was carried out in DMFA while boiling for 12 h and resulted in formation of 3-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-a]pyrazin-3-yl)propanoic acids or 4-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-a]pyrazin-3-yl) butanoic acids with the yield of 51-65%. To synthesize amides activation of the carboxylic group of the acids obtained was used by forming intermidiate imidazolyl amide with carbonyldiimidazole in anhydrous dioxane and the subsequent reaction with both aliphatic and aromatic amines while boiling for 12 h. The yield of the amides obtained was approximately 50-92%. The structure of the compounds obtained has been proven by elemental analysis and ^{1}H NMR spectroscopy data. The compounds synthesized are of certain interest as potential pharmacological agents associated with regulation of the lipid metabolism and the ability of these compounds to have an impact on the level of lipoproteins, metabolism of purines and suseptibility of tissues to glucose.

According to the literature data among compounds having the fragment of [1,2,4]triazolo[4,3-a]pyrazin-8(7H) the antagonists of adenosine receptors [1, 3, 8-10] have been found. One can assume that these compounds, being isosteric analogues of inosine, have a broad potential of the pharmacological activity; therefore, development of synthetic methods and the study of pharmacological properties of these compounds are up-to-date directions of pharmaceutical chemistry. Derivatives of [1,2,4]triazolo [4,3-a]pyrazin-8(7H)-one containing N-alkyl, alkylthio, alkylsulfinyl or alkylsulfonyl substituents in position 3 show antagonism towards receptors P_2X_7, and it is essential for treating pain or inflammatory diseases [7]. As their structural analogues 3-alkyl[1,2,4]triazolo[4,3-a]pyrazin-8(7H)-ones can reveal a broad spectrum of pharmacological effects. Our previous studies of probable types of the biological activity of 7-aryl/benzyl-3-alkyl [1,2,4]triazolo[4,3-a]pyrazin-8(7H)-ones using the PASS (Prediction of Activity Spectra for Substances) computer program [6] showed a high potential of the cytotoxic, membrane-stabilizing, cerebroprotective, cardioprotective activity of the compounds [8].

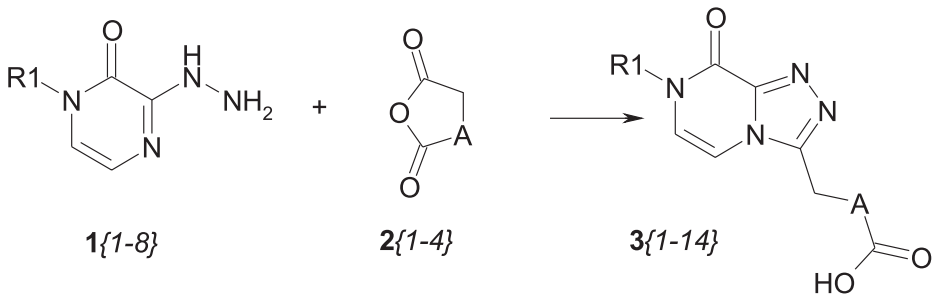
To enlarge the synthetically accessible 3,7-disubstituted [1,2,4]triazolo[4,3-*a*]pyrazin-8(7*H*)-one as promising pharmaceutical agents the study of ω-(7-substituted-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl) alkylcarboxylic acids and their amides is of a certain interest. Previous studies of this group of BAS *in silico* in addition to the above potential types of activity indicated that all the structures had a high obvious probability of pharmacological effects associated with regulation of the lipid metabolism and the ability of these compounds to have an impact on the level of lipoproteins, metabolism of purines and suseptibility of tissues to glucose [5].

The aim of this study was to develop the methods of synthesis and research of ω-(7-aryl-8-oxo-7,8-dihydro [1,2,4]triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids containing 2 or 3 carbon atoms and their amide derivatives in the acid residue.

Results and Discussion

Earlier we announced about the methods for the synthesis of N^7-substituted [1,2,4]triazolo[4,3-*a*]pyrazines using monoamides, monoesters, oxalic acids as initial compounds. Via the stages of pyrazin-2,3-diones, 3-chloropyrazin-2-ones and 3-hydrazinopyrazin-2-ones formation and further cyclization, using derivatives of carbonic acids, 3-alkyl/aryl-N^7-substituted[1,2,4]triazolo[4,3-*a*]pyrazin-8(7*H*)-ones were synthesized [2, 4].

For the synthesis of ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4] triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids **3***{1-14}* containing 2 or 3 carbon atoms in the acid residue the cyclization of the corresponding N^1-aryl-3-hydrazino-



1*{1-8}* **2***{1-4}* **3***{1-14}*

R1 = 3,5-diMePh, 3,4-diMePh, 4-OMePh, 3-FPh, 4-FPh, 4-ClPh, 3,4-diFPh, 4-OEtPh
A = CH_2, C_2H_5, $CH(CH_3)CH_2$, $C(CH_3)_2CH_2$

Scheme 1

pyrazin-2-ones with cyclic anhydrides, such as succinic and substituted glutaric anhydrides **2***{1-4}* was carried out (Scheme 1).

The reaction was carried out in anhydrous dimethyl formamide (DMFA) while boiling for 12 h. Target (7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids **3***{1-14}* were obtained with the yield of 51-65%.

For the synthesis of amides **7***{1-67}* carbonyldiimidazole (CDI) in the ratio of 1:1.1 was used as an activator of the carboxylic group of the corresponding acids **3***{1-14}* with formation of imidazolylamide **5***{1-14}*. The reaction was carried out in anhydrous dioxane with subsequent addition of both aliphatic and aromatic amines **6***{1-5}* to the reaction medium and boiling of the reaction mixture for 12 h. The yields of the amides synthesized are 50–92% depending on the nature of amines and the acid residue (Scheme 2).

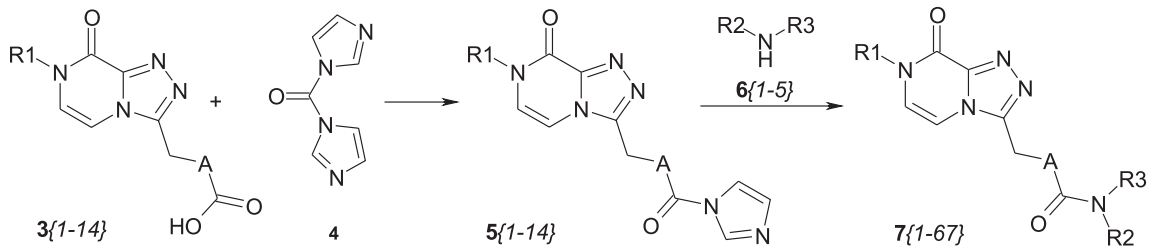
The structure of ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4] triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids **3***{1-14}* was proven by ^{1}H NMR spectroscopy data (Table). The formation of the [1,2,4]triazolo[4,3-*a*]pyrazin-8(7*H*)-one cycle is confirmed by the absence of any signals of NH protons of ^{1}H NMR-spectra of acids **3***{1-14}*. Instead of it, there is a signal of protons of the OH group, being as a broad singlet at δ 12.10-12.35 ppm. The signal of protons of the CH_2 group of the acid residue is also characteristic; it is registered as triplet at δ 2.81-2.82 ppm for CH_2-2 coupling, CH_2-3 at δ 3.20 ppm for propanoic acids **3***{1-4}*, and CH_2-2 at δ 2.20-2.42 ppm CH_2-3 at δ 3.00-3.11 ppm for butanoic acid **3***{5-14}*, respectively. Signals of H-5 and H-6 protons of the pyrazinone fragment are registered as doublets at δ 7.15-7.22 ppm and δ 7.56-7.66 ppm, respectively. The course of the amidation reaction is confirmed by disappearance of signals of OH protons of the carboxylic group and appearance of signals of NH protons of amide formation as singlets at δ 9.80-10.00 ppm for aromatic amides, as triplet signals at δ 7.83-7.97 ppm for isobutyl amides and at δ 8.28-8.66 ppm for benzyl and thienyl amides (Table).

Experimental Part

^{1}H NMR-spectra of the substances synthesized were recorded on a Varian WXR-400 (200 MHz) spectrometer. For all NMR-spectra DMSO-d_6 was used as a solvent, the internal standard was tetramethyl silane; chemical shifts were reported in ppm. Elemental analysis was performed on an Euro EA-3000 apparatus. Melting points were obtained on a Buchi B-520 device.

Yields of 3-hydrazinopyrazin-2(1H)-ones **1***{1-8}* were synthesized according to the method [2].

The general method of the synthesis of ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl) alkylcarboxylic acids 3*{1-14}*. Boil the mixture of 0.2 Mol of the corresponding *N*^{1}-aryl-3-hydrazinopyrazin-2(1*H*)-one **1***{1-8}* and 0.8 mmol of anhydride **2***{1-4}* in 100 ml of anhydrous DMFA for 12 h and after cooling dilute with water. Next day filter the precipitate, wash twice with 50 ml acetone and dry at 100°C for 20 h. Yields and ^{1}H NMR-spectra of the compounds obtained are given in Table.



3*{1-14}* **4** **5***{1-14}* **7***{1-67}*

R1 = 3,5-diMePh, 3,4-diMePh, 4-OMePh, 3-FPh, 4-FPh, 4-ClPh, 3,4-diFPh, 4-OEtPh
A = CH_2, C_2H_5, $CH(CH_3)CH_2$, $C(CH_3)_2CH_2$
R 2 = H, R 3 = i-Bu; R2 = H, R3 = 4-MePh; R2 = H, R3 = 4-OMeBn; R2 = H, R3 = 4-MePh;
R 2 = H, R 3 = 2-thienylCH_2; R 2, R 3 = 4-Phpiperazine

Scheme 2

Table

ω-(7-Aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids and their amides

Code of compound	R	Yield, %	^{1}H NMR-spectrum δ, ppm, *J*, hz
1	2	3	4
3*{1}*	R1 = 3,5-diMePh A = CH_2	60	2.30 (s, 6H, CH_3-3′,5′); 2.81 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.17 (d, *J* = 4.8, 1H, H-5); 7.63 (d, *J* = 4.8, 1H, H-6); 12.35 (s, 1H, OH)
3*{2}*	R1 = 3,4-diMePh A = CH_2	62	2.25 (s, 6H, CH_3-3′,4′); 2.81 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, J = 7.1, 2H, CH_2-3); 7.11-7.30 (m, 4H, H-5,2′,5′,6′); 7.63 (d, *J* = 4.8, 1H, H-6); 12.35 (s, 1H, OH)
3*{3}*	R1 = 4-OMePh A = CH_2	64	2.81 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 3.81 (s, 3H, OCH_3); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.37 (d, *J* = 7.8, 2H, H-2′,6′); 7.62 (d, *J* = 4.8, 1H, H-6); 12.30 (s, 1H, OH)
3*{4}*	R1 = 3-FPh A = CH_2	65	2.82 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 7.22 (d, *J* = 4.8, 1H, H-5); 7.30-7.44 (m, 3H, H-2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 12.35 (s, 1H, OH)
3*{5}*	R1 = 3-FPh A = $(CH_2)_2$	60	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.30-7.44 (m, 3H, H-2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 12.10 (s, 1H, OH)
3*{6}*	R1 = 4-FPh A = $(CH_2)_2$	62	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.36 (t, *J* = 8.2, 2H, H-3′,5′); 7.52 (qr, *J* = 5.2, 2H, H-2′,6′); 7.61 (d, *J* = 4.8, 1H, H-6); 12.10 (s, 1H, OH)
3*{7}*	R1 = 4-ClPh A = $(CH_2)_2$	63	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.50 (d, *J* = 8.0, 2H, H-3′,5′); 7.56-7.67 (m, 3H, H-6,2′,6′); 12.10 (s, 1H, OH)
3*{8}*	R1 = 3,5-diMePh A = $(CH_2)_2$	58	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.28-2.42 (m, 8H, CH_3-3′,5′+CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.58 (d, *J* = 4.8, 1H, H-6); 12.15 (s, 1H, OH)
3*{9}*	R1 = 3,4-diMePh A = $(CH_2)_2$	59	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.25 (s, 6H, CH_3-3′,4′); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.11-7.30 (m, 4H, H-5,2′,5′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 12.10 (s, 1H, OH)
3*{10}*	R1 = 3,4-diFPh A = $(CH_2)_2$	62	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.31-7.39 (m, 1H, H-6′); 7.56-7.78 (m, 3H, H-6,2′,5′); 12.10 (s, 1H, OH)
3*{11}*	R1 = 4-OEtPh A = $(CH_2)_2$	59	1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 12.10 (s, 1H, OH)
3*{12}*	R1 = 3-FPh A = $CH(CH_3)CH_2$	52	0.90 (d, *J* = 7.0, 3H, CH_3-3); 2.20-2.42 (m, 3H, CH+CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 7.20-7.42 (m, 4H, H-5,2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 12.20 (s, 1H, OH)
3*{13}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$	54	0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 2.20-2,42 (m, 3H, CH+CH_2-2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.60 (d, *J* = 4.8, 1H, H-6); 12.15 (s, 1H, OH)
3*{14}*	R1 = 3-FPh A = $C(CH_3)_2CH_2$	51	1.05 (s, 6H, $2CH_3$); 2.30 (s, 2H, CH_2-2); 3.11 (s, 2H, CH_2-4); 7.22 (d, *J* = 4.9, 1H, H-5); 7.32-7.42 (m, 3H, H-2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.67 (d, *J* = 4.9, 1H, H-6); 12.10 (s, 1H, OH)
7*{1}*	R1 = 3,5-diMePh A = CH_2 R2 = H; R3 = i-Bu	80	0.75 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 2.28 (s, 6H, CH_3-3′,5′); 2.66 (t, *J* = 7.1, 2H, CH_2-2); 2.86 (t, *J* = 7.0, 2H, NCH_2); 3.18 (t, *J* = 7.1, 2H, CH_2-3); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.56 (d, *J* = 4.8, 1H, H-6); 7.97 (t, *J* = 7.0, 1H, NH)
7*{2}*	R1 = 3,5-diMePh A = CH_2 R2 = H; R3 = 4-MePh	74	2.20 (s, 3H, CH_3-4″); 2.30 (s, 6H, CH_3-3′,5′); 2.84 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 7.02-7.13 (m, 5H, H-2′,4′,6′,3″,5″); 7.17 (d, *J* = 4.8, 1H, H-5); 7.43 (d, *J* = 7.8, 2H, H-2″,6″); 7.63 (d, *J* = 4.8, 1H, H-6); 10.00 (s, 1H, NH)
7*{3}*	R1 = 3,5-diMePh A = CH_2 R2 = H; R3 = 4-OMeBn	91	2.30 (s, 6H, CH_3-3′,5′); 2.72 (t, *J* = 7.1, 2H, CH_2-2); 3.18 (t, *J* = 7.1, 2H, CH_2-3); 3.67 (s, 3H, OCH_3); 4.14 (d, *J* = 7.0, 2H, CH_2-Bn); 6.81 (d, *J* = 7.8, 2H, H-3″,5″); 7.02-7.20 (m, 6H, H-5,2′,4′,6′,2″,6″); 7.57 (d, *J* = 4.8, 1H, H-6); 8.43 (t, *J* = 7.0, 1H, NH)

Continuation of Table

1	2	3	4
7*{4}*	R1 = 3,5-diMePh A = CH_2 R2 = H; R3 = 2-thienylCH_2	90	2.28 (s, 6H, CH_3-3′,5′); 2.72 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.34 (t, *J* = 4.0, 1H, H-4″); 7.59 (d, *J* = 4.8, 1H, H-6); 8.62 (t, *J* = 7.0, 1H, NH)
7*{5}*	R1 = 3,5-diMePh A = CH_2 R2, R3 = 4-Piperazine	76	2.30 (s, 6H, CH_3-3′,5′); 2.91 (t, *J* = 7.1, 2H, CH_2-2); 3.05-3.25 (m, 6H, CH_2-3+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.12-7.26 (m, 3H, H-5,3″,5″); 7.64 (d, *J* = 4.8, 1H, H-6)
7*{6}*	R1 = 3,4-diMePh A = CH_2 R2 = H; R3 = i-Bu	81	0.75 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 2.22 (s, 6H, CH_3-3′,4′); 2.66 (t, *J* = 7.1, 2H, CH_2-2); 2.86 (t, *J* = 7.1, 2H, NCH_2); 3.18 (t, *J* = 7.1, 2H, CH_2-3); 7.11-7.30 (m, 4H, H-5,2′,5′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 7.97 (t, *J* = 7.0, 1H, NH)
7*{7}*	R1 = 3,4-diMePh A = CH_2 R2 = H; R3 = 4-MePh	73	2.20 (s, 3H, CH_3-4″); 2.25 (s, 6H, CH_3-3′,4′); 2.90 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 7.02-7.30 (m, 6H, H-5, 2′,5′,6′,3″,5″); 7.43 (d, *J* = 7.8, 2H, H-2″,6″); 7.63 (d, *J* = 4.8, 1H, H-6); 10.00 (s, 1H, NH)
7*{8}*	R1 = 3,4-diMePh A = CH_2 R2 = H; R3 = 4-OMeBn	88	2.22 (s, 6H, CH_3-3′,4′); 2.72 (t, *J* = 7.1, 2H, CH_2-2); 3.18 (t, *J* = 7.1, 2H, CH_2-3); 3.68 (s, 3H, OCH_3); 4.12 (d, *J* = 7.0, 2H, CH_2-Bn); 6.81 (d, *J* = 7.8, 2H, H-3″,5″); 7.02-7.30 (m, 6H, H-5,2′,5′,6′,2″,6″); 7.57 (d, *J* = 4.8, 1H, H-6); 8.42 (t, *J* = 7.0, 1H, NH)
7*{9}*	R1 = 3,4-diMePh A = CH_2 R2 = H; R3 = 2-thienylCH_2	91	2.25 (s, 6H, CH_3-3′,4′); 2.72 (t, *J* = 7.1, 2H, CH_2-2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 4.38 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.11-7.28 (m, 4H, H-5,2′,5′,6′); 7.34 (t, *J* = 4.0, 1H, H-4″); 7.58 (d, *J* = 4.8, 1H, H-6); 8.62 (t, *J* = 7.0, 1H, NH)
7*{10}*	R1 = 3,4-diMePh A = CH_2 R2, R3 = 4-Piperazine	75	2.25 (s, 6H, CH_3-3′,4′); 2.91 (t, *J* = 7.1, 2H, CH_2-2); 3.05-3.25 (m, 6H, CH_2-3+4CH-Pip); 3.45-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.11-7.30 (m, 6H, H-5,2′,5′,6′,3″,5″); 7.63 (d, *J* = 4.8, 1H, H-6)
7*{11}*	R1 = 4-OMePh A = CH_2 R2 = H; R3 = i-Bu	85	0.78 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 2.68 (t, *J* = 7.1, 2H, CH_2-2); 2.85 (t, *J* = 7.0, 2H, NCH_2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 3.81 (s, 3H, OCH_3); 7.05 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.37 (d, *J* = 7.8, 2H, H-2′,6′); 7.58 (d, *J* = 4.8, 1H, H-6); 7.98 (t, *J* = 7.0, 1H, NH)
7*{12}*	R1 = 4-OMePh A = CH_2 R2 = H; R3 = 4-MePh	72	2.22 (s, 3H, CH_3-4″); 2.95 (t, *J* = 7.1, 2H, CH_2-2); 3.25 (t, *J* = 7.1, 2H, CH_2-3); 3.81 (s, 3H, OCH_3); 7.02-7.14 (m, 4H, H-3′,5′,3″,5″); 7.18 (d, *J* = 4.8, 1H, H-5); 7.37 (d, *J* = 7.8, 2H, H-2′,6′); 7.45 (d, *J* = 7.8, 2H, H-2″,6″); 7.64 (d, *J* = 4.8, 1H, H-6); 10.00 (s, 1H, NH)
7*{13}*	R1 = 4-OMePh A = CH_2 R2 = H; R3 = 4-OMeBn	90	2.73 (t, *J* = 7.1, 2H, CH_2-2); 3.23 (t, *J* = 7.1, 2H, CH_2-3); 3.67 (s, 3H, OCH_3); 3.81 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.82 (d, *J* = 7.8, 2H, H-3″,5″); 7.02-7.20 (m, 5H, H-5,3′,5′,2″,6″); 7.37 (d, *J* = 7.8, 2H, H-2′,6′); 7.58 (d, *J* = 4.8, 1H, H-6); 8.43 (t, *J* = 7.0, 1H, NH)
7*{14}*	R1 = 4-OMePh A = CH_2 R2 = H; R3 = 2-thienylCH_2	92	2.78 (t, *J* = 7.1, 2H, CH_2-2); 3.28 (t, *J* = 7.1, 2H, CH_2-3); 3.86 (s, 3H, OCH_3); 4.48 (d, *J* = 7.0, 2H, NCH_2); 6.90-7.02 (m, 2H, H-3″,5″); 7.13 (d, *J* = 7.8, 2H, H-3′,5′); 7.22 (d, *J* = 4.8, 1H, H-5); 7.36-7.48 (m, 3H, H-2′,6′,4″); 7.64 (d, *J* = 4.8, 1H, H-6); 8.66 (t, *J* = 7.0, 1H, NH)
7*{15}*	R1 = 4-OMePh A = CH_2 R2, R3 = 4-Piperazine	77	2.95-3.30 (m, 8H, CH_2-2,3+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 3.81 (s, 3H, OCH_3); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.95 (d, *J* = 7.8, 2H, H-2″,6″); 7.07 (d, *J* = 7.8, 2H, H-3′,5′); 7.14-7.28 (m, 3H, H-5,3″,5″); 7.40 (d, *J* = 7.8, 2H, H-2′,6′); 7.65 (d, *J* = 4.8, 1H, H-6)
7*{16}*	R1 = 3-FPh A = CH_2 R2 = H; R3 = i-Bu	85	0.75 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 2.70 (t, *J* = 7.1, 2H, CH_2-2); 2.86 (t, *J* = 7.0, 2H, NCH_2); 3.20 (t, *J* = 7.1, 2H, CH_2-3); 7.22 (d, *J* = 4.8, 1H, H-5); 7.30-7.44 (m, 3H, H-2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 7.98 (t, *J* = 7.0, 1H, NH)
7*{17}*	R1 = 3-FPh A = CH_2 R2 = H; R3 = 4-MePh	76	2.20 (s, 3H, CH_3-4″); 2.92 (t, *J* = 7.1, 2H, CH_2-2); 3.25 (t, *J* = 7.1, 2H, CH_2-3); 7.05 (d, *J* = 7.8, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.27-7.47 (m, 5H, H-2′,4′,5′,2″,6″); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 10.00 (s, 1H, NH)

Continuation of Table

1	2	3	4
7*{18}*	R1 = 3-FPh A = CH_2 R2 = H; R3 = 4-OMeBn	92	2.73 (t, *J* = 7.1, 2H, CH_2-2); 3.23 (t, *J* = 7.1, 2H, CH_2-3); 3.67 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.82 (d, *J* = 7.8, 2H, H-3″,5″); 7.14 (d, *J* = 7.8, 2H, H-2″,6″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.28-7.46 (m, 3H, H-2′,4′,5′); 7.50-7.66 (m, 2H, H-6,6′); 8.43 (t, *J* = 7.0, 1H, NH)
7*{19}*	R1 = 3-FPh A = CH_2 R2 = H; R3 = 2-thienylCH_2	90	2.73 (t, *J* = 7.1, 2H, CH_2-2); 3.23 (t, *J* = 7.1, 2H, CH_2-3); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.24 (d, *J* = 4.8, 1H, H-5); 7.28-7.46 (m, 4H, H-2′,4′,5′,4″); 7.52-7.67 (m, 2H, H-6,6′); 8.60 (t, *J* = 7.0, 1H, NH)
7*{20}*	R1 = 3-FPh A = CH_2 R2, R3 = 4-Piperazine	76	2.95-3.30 (m, 8H, CH_2-2,3+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.94 (d, *J* = 7.8, 2H, H-2″,6″); 7.15-7.44 (m, 6H, H-5,2′,4′,5′,3″,5″); 7.56 (qr, *J* = 5.2, 1H, H-6′); 7.68 (d, *J* = 4.8, 1H, H-6)
7*{21}*	R1 = 3-FPh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	82	0.78 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (t, *J* = 7.0, 2H, CH_2-2); 2.86 (t, *J* = 7.0, 2H, NCH_2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.24 (d, *J* = 4.8, 1H, H-5); 7.28-7.46 (m, 3H, H-2′,4′,5′); 7.50-7.66 (m, 2H, H-6,6′); 7.83 (t, *J* = 7.0, 1H, NH)
7*{22}*	R1 = 3-FPh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	73	2.03 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.05 (d, *J* = 7.8, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.30-7.47 (m, 5H, H-2′,4′,5′,2″,6″); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.65 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{23}*	R1 = 3-FPh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	90	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.23 (t, *J* = 7.0, 2H, CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.18 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.13 (d, *J* = 7.8, 2H, H-2″,6″); 7.24 (d, *J* = 4.8, 1H, H-5); 7.28-7.46 (m, 3H, H-2′,4′,5′); 7.50-7.66 (m, 2H, H-6,6′); 8.28 (t, *J* = 7.0, 1H, NH)
7*{24}*	R1 = 3-FPh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	86	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.24 (t, *J* = 7.0, 2H, CH_2-2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.24 (d, *J* = 4.8, 1H, H-5); 7.28-7.46 (m, 4H, H-2′,4′,5′,4″); 7.52-7.64 (m, 2H, H-6,6′); 8.48 (t, *J* = 7.0, 1H, NH)
7*{25}*	R1 = 3-FPh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	76	1.97 (t, *J* = 7.0, 2H, CH_2-3); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.00-3.20 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.15-7.44 (m, 6H, H-5,2′,4′,5′,3″,5″); 7.52 (qr, *J* = 5.2, 1H, H-6′); 7.65 (d, *J* = 4.8, 1H, H-6)
7*{26}*	R1 = 4-FPh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	84	0.75 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 2.86 (t, *J* = 7.0, 2H, NCH_2); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.22 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.16 (d, *J* = 4.8, 1H, H-5); 7.36 (t, *J* = 8.2, 2H, H-3′,5′); 7.50-7.62 (m, 3H, H-6,2′,6′); 7.83 (t, *J* = 7.0, 1H, NH)
7*{27}*	R1 = 4-FPh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	73	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.06 (d, *J* = 7.8, 2H, H-3″,5″); 7.21 (d, *J* = 4.8, 1H, H-5); 7.31-7.56 (m, 6H, H-2′,3′,5′,6′,2″,6″); 7.64 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{28}*	R1 = 4-FPh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	92	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.23 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.14 (d, *J* = 7.8, 2H, H-2″,6″); 7.20 (d, *J* = 4.8, 1H, H-5); 7.36 (t, *J* = 8.2, 2H, H-3′,5′); 7.46-7.62 (m, 3H, H-6,2′,6′); 8.29 (t, *J* = 7.0, 1H, NH)
7*{29}*	R1 = 4-FPh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	87	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.23 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.20 (d, *J* = 4.8, 1H, H-5); 7.28-7.44 (m, 3H, H-3′,5′,4″); 7.46-7.62 (m, 3H, H-6,2′,6′); 8.48 (t, *J* = 7.0, 1H, NH)
7*{30}*	R1 = 4-FPh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	77	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.00-3.15 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.14-7.26 (m, 3H, H-5,3″,5″); 7.36 (t, *J* = 8.2, 2H, H-3′,5′); 7.51 (t, *J* = 8.2, 2H, H-2′,6′); 7.64 (d, *J* = 4.8, 1H, H-6)
7*{31}*	R1 = 4-ClPh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	80	0.80 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (t, *J* = 7.0, 2H, CH_2-2); 2.86 (t, *J* = 7.0, 2H, NCH_2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.50 (d, *J* = 8.0, 2H, H-3′,5′); 7.55-7.67 (m, 3H, H-6,2′,6′); 7.83 (t, *J* = 7.0, 1H, NH)

Continuation of Table

1	2	3	4
7*{32}*	R1 = 4-ClPh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	75	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.06 (d, *J* = 7.8, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.42-7.67 (m, 7H, H-6,2′,3′,5′,6′,2″,6″); 9.83 (s, 1H, NH)
7*{33}*	R1 = 4-ClPh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	87	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.24 (t, *J* = 7.0, 2H, CH_2-2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.12 (d, *J* = 7.8, 2H, H-2″,6″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.50 (d, *J* = 8.0, 2H, H-3′,5′); 7.55-7.67 (m, 3H, H-6,2′,6′); 8.28 (t, *J* = 7.0, 1H, NH)
7*{34}*	R1 = 4-ClPh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	91	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.22 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.34 (t, *J* = 4.0, 1H, H-4″); 7.50 (d, *J* = 8.0, 2H, H-3′,5′); 7.55-7.67 (m, 3H, H-6,2′,6′); 8.45 (t, *J* = 7.0, 1H, NH)
7*{35}*	R1 = 4-ClPh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	78	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05-3.25 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.12-7.26 (m, 3H, H-5,3″,5″); 7.50 (d, *J* = 8.0, 2H, H-3′,5′); 7.55-7.67 (m, 3H, H-6,2′,6′)
7*{36}*	R1 = 3,5-diMePh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	84	0.78 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (t, *J* = 7.0, 2H, CH_2-2); 2.28 (s, 6H, CH_3-3′,5′); 2.83 (t, *J* = 7.0, 2H, NCH_2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 7.04 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.57 (d, *J* = 4.8, 1H, H-6); 7.83 (t, *J* = 7.0, 1H, NH)
7*{37}*	R1 = 3,5-diMePh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	74	2.00 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.30 (s, 6H, CH_3-3′,5′); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.03-7.11 (m, 5H, H-2′,4′,6′,3″,5″); 7.16 (d, *J* = 4.8, 1H, H-5); 7.44 (d, *J* = 7.8, 2H, H-2″,6″); 7.59 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{38}*	R1 = 3,5-diMePh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	87	2.00 (t, *J* = 7.0, 2H, CH_2-3); 2.26 (t, *J* = 7.0, 2H, CH_2-2); 2.30 (s, 6H, CH_3-3′,5′); 3.03 (t, *J* = 7.0, 2H, CH_2-4); 3.70 (s, 3H, OCH_3); 4.17 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.06 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.12 (m, 3H, H-5,2″,6″); 7.58 (d, *J* = 4.8, 1H, H-6); 8.28 (t, *J* = 7.0, 1H, NH)
7*{39}*	R1 = 3,5-diMePh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	86	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.22 (t, *J* = 7.0, 2H, CH_2-2); 2.30 (s, 6H, CH_3-3′,5′); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.05 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.34 (t, *J* = 4.0, 1H, H-4″); 7.56 (d, *J* = 4.8, 1H, H-6); 8.48 (t, *J* = 7.0, 1H, NH)
7*{40}*	R1 = 3,5-diMePh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	77	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.30 (s, 6H, CH_3-3′,5′); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 2.95-3.15 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.77 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.05 (s, 2H, H-2′,6′); 7.09 (s, 1H, H-4′); 7.12-7.26 (m, 3H, H-5,3″,5″); 7.60 (d, *J* = 4.8, 1H, H-6)
7*{41}*	R1 = 3,4-diMePh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	81	0.78 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.67 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.15-2.30 (m, 8H, CH_2-2+CH_3-3′,4′); 2.86 (t, *J* = 7.0, 2H, NCH_2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 7.11-7.30 (m, 4H, H-5,2′,5′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 7.83 (t, *J* = 7.0, 1H, NH)
7*{42}*	R1 = 3,4-diMePh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	73	2.02 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.25 (s, 6H, CH_3-3′,4′); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 7.03-7.26 (m, 6H, H-5,2′,5′,6′,3″,5″); 7.44 (d, *J* = 7.8, 2H, H-2″,6″); 7.59 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{43}*	R1 = 3,4-diMePh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	88	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.15-2.30 (m, 8H, CH_2-2+CH_3-3′,4′); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.18 (d, *J* = 7.0, 2H, CH_2-Bn); 6.83 (d, *J* = 7.8, 2H, H-3″,5″); 7.08-7.28 (m, 6H, H-5,2′,5′,6′,2″,6″); 7.58 (d, *J* = 4.8, 1H, H-6); 8.28 (t, *J* = 7.0, 1H, NH)
7*{44}*	R1 = 3,4-diMePh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	85	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.15-2.30 (m, 8H, CH_2-2+CH_3-3′,4′); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.11-7.28 (m, 4H, H-5,2′,5′,6′); 7.34 (t, *J* = 4.0, 1H, H-4″); 7.56 (d, *J* = 4.8, 1H, H-6); 8.48 (t, *J* = 7.0, 1H, NH)
7*{45}*	R1 = 3,4-diMePh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	76	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.22 (s, 6H, CH_3-3′,4′); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.00-3.25 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.10-7.26 (m, 6H, H-5,2′,5′,6′,3″,5″); 7.59 (d, *J* = 4.8, 1H, H-6)

Continuation of Table

1	2	3	4
7*{46}*	R1 = 3,4-diFPh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	82	0.80 (d, *J* = 7.0, 6H, $2CH_3$); 1.55-1.70 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (t, *J* = 7.0, 2H, CH_2-2); 2.84 (t, *J* = 7.0, 2H, NCH_2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 7.22 (d, *J* = 4.8, 1H, H-5); 7.31-7.39 (m, 1H, H-6′); 7.56-7.78 (m, 3H, H-6,2′,5′); 7.84 (t, *J* = 7.0, 1H, NH)
7*{47}*	R1 = 3,4-diFPh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	76	2.00 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 3.03 (t, *J* = 7.0, 2H, CH_2-4); 7.05 (d, *J* = 7.8, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.31-7.49 (m, 3H, H-6′,2″,6″); 7.56-7.78 (m, 3H, H-6,2′,5′); 9.80 (s, 1H, NH)
7*{48}*	R1 = 3,4-diFPh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	86	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.24 (t, *J* = 7.0, 2H, CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.11 (d, *J* = 7.8, 2H, H-2″,6″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.31-7.39 (m, 1H, H-6′); 7.56-7.78 (m, 3H, H-6,2′,5′); 8.28 (t, *J* = 7.0, 1H, NH)
7*{49}*	R1 = 3,4-diFPh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	85	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.22 (t, *J* = 7.0, 2H, CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.22 (d, *J* = 4.8, 1H, H-5); 7.31-7.43 (m, 2H, H-6′,4″); 7.56-7.78 (m, 3H, H-6,2′,5′); 8.48 (t, *J* = 7.0, 1H, NH)
7*{50}*	R1 = 3,4-diFPh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	75	1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.40 (t, *J* = 7.0, 2H, CH_2-2); 2.95-3.15 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.12-7.26 (m, 3H, H-5,3″,5″); 7.31-7.39 (m, 1H, H-6′); 7.56-7.78 (m, 3H, H-6,2′,5′)
7*{51}*	R1 = 4-OEtPh A = $(CH_2)_2$ R2 = H; R3 = i-Bu	82	0.76 (d, *J* = 7.0, 6H, $2CH_3$); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.55-1.70 (m, 1H, CH); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.18 (t, *J* = 7.0, 2H, CH_2-2); 2.84 (t, *J* = 7.0, 2H, NCH_2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 7.84 (t, *J* = 7.0, 1H, NH)
7*{52}*	R1 = 4-OEtPh A = $(CH_2)_2$ R2 = H; R3 = 4-MePh	72	1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.20 (s, 3H, CH_3-4″); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.05 (t, *J* = 7.0, 2H, CH_2-4); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 6.97-7.08 (m, 4H, H-3′,5′,3″,5″); 7.16 (d, *J* = 4.8, 1H, H-5); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.44 (d, *J* = 7.8, 2H, H-2″,6″); 7.58 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{53}*	R1 = 4-OEtPh A = $(CH_2)_2$ R2 = H; R3 = 4-OMeBn	89	1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.23 (t, *J* = 7.0, 2H, CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 3.67 (s, 3H, OCH_3); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.83 (d, *J* = 7.8, 2H, H-3″,5″); 7.02 (d, *J* = 7.8, 2H, H-3′,5′); 7.10-7.20 (m, 3H, H-5,2″,6″); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.56 (d, *J* = 4.8, 1H, H-6); 8.28 (t, *J* = 7.0, 1H, NH)
7*{54}*	R1 = 4-OEtPh A = $(CH_2)_2$ R2 = H; R3 = 2-thienylCH_2	88	1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.23 (t, *J* = 7.0, 2H, CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16 (d, *J* = 4.8, 1H, H-5); 7.30-7.40 (m, 3H, H-2′,6′,4″); 7.56 (d, *J* = 4.8, 1H, H-6); 8.46 (t, *J* = 7.0, 1H, NH)
7*{55}*	R1 = 4-OEtPh A = $(CH_2)_2$ R2, R3 = 4-Piperazine	72	1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.95 (t, *J* = 7.0, 2H, CH_2-3); 2.35 (t, *J* = 7.0, 2H, CH_2-2); 3.00-3.15 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 4.08 (qr, *J* = 7.8, 2H, OCH_2); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.12-7.26 (m, 3H, H-5,3″,5″); 7.35 (d, *J* = 7.8, 2H, H-2′,6′); 7.58 (d, *J* = 4.8, 1H, H-6)
7*{56}*	R1 = 3-FPh A = $CH(CH_3)CH_2$ R2 = H; R3 = i-Bu	73	0.80 (d, *J* = 7.0, 6H, $2CH_3$); 0.90 (d, *J* = 7.0, 3H, CH_3-3); 1.55-1.70 (m, 1H, CH); 2.00-2.40 (m, 3H, CH+CH_2-2); 2.86 (t, *J* = 7.0, 2H, NCH_2); 2.98 (t, *J* = 7.0, 2H, CH_2-4); 7.20-7.42 (m, 4H, H-5,2′,4′,5′); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 7.84 (t, *J* = 7.0, 1H, NH)
7*{57}*	R1 = 3-FPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 4-MePh	71	0.90 (d, *J* = 7.0, 3H, CH_3-3); 2.20 (s, 3H, CH_3-4″); 2.24-2.40 (m, 3H, CH+CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 7.05 (d, *J* = 7.8, 2H, H-3″,5″); 7.24-7.46 (m, 6H, H-5,2′,4′,5′,2″,6″); 7.56 (qr, *J* = 5.2, 1H, H-6′); 7.68 (d, *J* = 4.8, 1H, H-6); 9.80 (s, 1H, NH)
7*{58}*	R1 = 3-FPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 4-OMeBn	75	0.90 (d, *J* = 7.0, 3H, CH_3-3); 2.00-2.40 (m, 3H, CH+CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 3.68 (s, 3H, OCH_3); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.10-7.42 (m, 6H, H-5,2′,4′,5′,2″,6″); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 8.33 (t, *J* = 7.0, 1H, NH)

Continuation of Table

1	2	3	4
7*{59}*	R1 = 3-FPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 2-thienylCH_2	74	0.90 (d, *J* = 7.0, 3H, CH_3-3); 2.00-2.40 (m, 3H, CH+CH_2-2); 3.00 (t, *J* = 7.0, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.20-7.46 (m, 5H, H-5,2′,4′,5′,4″); 7.54 (qr, *J* = 5.2, 1H, H-6′); 7.66 (d, *J* = 4.8, 1H, H-6); 8.52 (t, *J* = 7.0, 1H, NH)
7*{60}*	R1 = 3-FPh A = $CH(CH_3)CH_2$ R2, R3 = 4-Piperazine	70	0.90 (d, *J* = 7.0, 3H, CH_3-3); 2.20-2.40 (m, 3H, CH+CH_2-2); 2.80-3.20 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.16-7.44 (m, 6H, H-5,2′,4′,5′,3″,5″); 7.56 (qr, *J* = 5.2, 1H, H-6′); 7.75 (d, *J* = 4.8, 1H, H-6)
7*{61}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$ R2 = H; R3 = i-Bu	74	0.80 (d, *J* = 7.0, 6H, $2CH_3$); 0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 1.55-1.70 (m, 1H, CH); 2.20-2,42 (m, 3H, CH+CH_2-2); 2.87 (t, *J* = 7.0, 2H, NCH_2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.18 (d, *J* = 4.8, 1H, H-5); 7.36 (d, *J* = 7.8, 2H, H-2′,6′); 7.61 (d, *J* = 4.8, 1H, H-6); 7.86 (t, *J* = 7.0, 1H, NH)
7*{62}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 4-MePh	72	0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 2.20 (s, 3H, CH_3-4″); 2.26-2,42 (m, 3H, CH+CH_2-2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 7.02-7.13 (m, 4H, H-3′,5′,3″,5″); 7.18 (d, *J* = 4.8, 1H, H-5); 7.36 (d, *J* = 7.8, 2H, H-2′,6′); 7.43 (d, *J* = 7.8, 2H, H-2″,6″); 7.64 (d, *J* = 4.8, 1H, H-6); 9.86 (s, 1H, NH)
7*{63}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 4-OMeBn	79	0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 2.10-2,42 (m, 3H, CH+CH_2-2); 2.95 (t, *J* = 7.0, 2H, CH_2-4); 3.68 (s, 3H, OCH_3); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 4.15 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.09-7.20 (m, 3H, H-5,2″,6″); 7.36 (d, *J* = 7.8, 2H, H-2′,6′); 7.60 (d, *J* = 4.8, 1H, H-6); 8.36 (t, *J* = 7.0, 1H, NH)
7*{64}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$ R2 = H; R3 = 2-thienylCH_2	80	0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 2.10-2,45 (m, 3H, CH+CH_2-2); 3.02 (t, *J* = 7.0, 2H, CH_2-4); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.18 (d, *J* = 4.8, 1H, H-5); 7.32-7.40 (m, 3H, H-2′,6′,4″); 7.61 (d, *J* = 4.8, 1H, H-6); 8.52 (t, *J* = 7.0, 1H, NH)
7*{65}*	R1 = 4-OEtPh A = $CH(CH_3)CH_2$ R2, R3 = 4-Piperazine	68	0.92 (d, *J* = 7.0, 3H, CH_3-3); 1.32 (t, *J* = 7.8, 3H, CH_3(Et)); 2.20-2,42 (m, 3H, CH+CH_2-2); 2.80-3.25 (m, 6H, CH_2-4+4CH-Pip); 3.50-3.65 (m, 4H, CH-Pip); 4,08 (qr, *J* = 7.8, 2H, OCH_2); 6.79 (t, *J* = 7.8, 1H, H-4″); 6.93 (d, *J* = 7.8, 2H, H-2″,6″); 7.04 (d, *J* = 7.8, 2H, H-3′,5′); 7.16-7.26 (m, 3H, H-5,3″,5″); 7.36 (d, *J* = 7.8, 2H, H-2′,6′); 7.68 (d, *J* = 4.8, 1H, H-6)
7*{66}*	R1 = 3-FPh A = $C(CH_3)_2CH_2$ R2 = H; R3 = 4-OMeBn	51	1.05 (s, 6H, $2CH_3$); 2.13 (s, 2H, CH_2-2); 3.11 (s, 2H, CH_2-4); 3.68 (s, 3H, OCH_3); 4.12 (d, *J* = 7.0, 2H, CH_2-Bn); 6.85 (d, *J* = 7.8, 2H, H-3″,5″); 7.10 (d, *J* = 7.8, 2H, H-2″,6″); 7.22 (d, *J* = 4.9, 1H, H-5); 7.25-7.42 (m, 3H, H-2′,4′,5′); 7.56 (qr, *J* = 5.2, 1H, H-6′); 7.74 (d, *J* = 4.9, 1H, H-6); 8.30 (t, *J* = 7.0, 1H, NH)
7*{67}*	R1 = 3-FPh A = $C(CH_3)_2CH_2$ R2 = H; R3 = 2-thienylCH_2	50	1.05 (s, 6H, $2CH_3$); 2.13 (s, 2H, CH_2-2); 3.11 (s, 2H, CH_2-4); 4.40 (d, *J* = 7.0, 2H, NCH_2); 6.88-6.94 (m, 2H, H-3″,5″); 7.24 (d, *J* = 4.9, 1H, H-5); 7.30-7.47 (m, 4H, H-2′,4′,5′,4″); 7.58 (qr, *J* = 5.2, 1H, H-6′); 7.72 (d, *J* = 4.9, 1H, H-6); 8.48 (t, *J* = 7.0, 1H, NH)

The general method of the synthesis of ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl) alkylcarboxamides 7*{1-67}*. Heat the suspension of 0.005 Mol of the corresponding ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acid **3***{1-14}* and 0.81 g (0.0055 Mol) 1,1-carbonyldiimidazole **4** (CDI) in 5 ml of anhydrous dioxane for 1 h when constantly stirring. Then add 0.006 mmol of the corresponding amine **6***{1-5}*, heat the reaction mixture at the temperature of 90°C for 12 h. Dilute the cooled mixture with water and leave for 48 h. Filter the precipitate formed, wash with water and recrystallize from the mixture of dimethyl formamide – propanol-2. Yields and ^{1}H NMR-spectra of the compounds obtained are given in Table.

CONCLUSIONS

By the methods developed large amounts of different ω-(7-aryl-8-oxo-7,8-dihydro[1,2,4]triazolo[4,3-*a*]pyrazin-3-yl)alkylcarboxylic acids and their amide derivatives have been synthesized. They are of great interest for further biological screening in order to find substances among them with properties associated with regulation of the lipid metabolism and the ability of these compounds to have an impact on the level of lipoproteins, metabolism of purines and suseptibility of tissues to glucose.

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СИНТЕЗ ω-(7-АРИЛ-8-ОКСО-7,8-ДИГІДРО[1,2,4]-ТРИАЗОЛО-[4,3-*а*]ПІРАЗИН-3-ІЛ) АЛКІЛКАРБОНОВИХ КИСЛОТ ТА ЇХ АМІДОВАНИХ ПОХІДНИХ ЯК ПЕРСПЕКТИВНИХ ФАРМАЦЕВТИЧНИХ АГЕНТІВ

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***Ключові слова**: 3-гідразинопіразин-2-он; [1,2,4]триазоло[4,3-а]піразин-8(7Н)-он; бурштиновий ангідрид; глутаровий ангідрид; циклізація; аміди*

Розроблена раніше зручна та ефективна схема синтезу 3,7-дизаміщених 7Н-[1,2,4]триазоло [4,3-а]піразин-8-онів була поширена на похідні ω-(7-арил-8-оксо-7,8-дигідро[1,2,4]-триазоло-[4,3-а]піразин-3-іл)алкілкарбонових кислот. Наш підхід полягає в застосуванні реакції раніше описаних 3-гідразинопіразин-2-онів з циклічними ангідридами дикарбонових кислот, такими як бурштиновий та глутаровий ангідриди. Послідовна циклізація проводилася в ДМФА при кип'ятінні впродовж 12 годин та привела до утворення 3-(7-арил-8-оксо-7,8-дигідро[1,2,4]-триазоло-[4,3-а]піразин-3-іл)пропанових або 4-(7-арил-8-оксо-7,8-дигідро[1,2,4]-триазоло-[4,3-а] піразин-3-іл)бутанових кислот з виходом 51-65%. Для отримання амідів ми використовували активацію карбоксильної групи в одержаних кислотах через утворення проміжного імідазоліламіду за допомогою карбонілдіімідазолу в безводному діоксані з подальшою реакцією як з аліфатичними, так і з ароматичними амінами при кип'ятінні впродовж 12 годин. Вихід отриманих амідів складав 50-92%. Структура отриманих сполук доведена за допомогою елементного аналізу та даних ^{1}Н ЯМР-спектроскопії. Синтезовані сполуки представляють певний інтерес як потенційні фармакологічні об'єкти, зв'язані з регуляцією ліпідного метаболізму та їх спроможністю впливати на рівень ліпідопротеїнів, метаболізм пуринів та сприйнятливість тканин до глюкози.

СИНТЕЗ ω-(7-АРИЛ-8-ОКСО-7,8-ДИГИДРО[1,2,4]-ТРИАЗОЛО-[4,3-*а*]ПИРАЗИН-3-ИЛ) АЛКИЛКАРБОНОВЫХ КИСЛОТ И ИХ АМИДИРОВАННЫХ ПРОИЗВОДНЫХ В КАЧЕСТВЕ ПЕРСПЕКТИВНЫХ ФАРМАЦЕВТИЧЕСКИХ АГЕНТОВ

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***Ключевые слова**: 3-гидразинопиразин-2-он; [1,2,4]триазоло[4,3-а]пиразин-8(7Н)-он; янтарный ангидрид; глутаровый ангидрид; циклизация; амиды*

Разработанная ранее удобная и эффективная схема синтеза 3,7-дизамещенных 7Н-[1,2,4] триазоло[4,3-а]пиразин-8-онов была распространена на производные ω-(7-арил-8-оксо-7,8-дигидро[1,2,4]-триазоло-[4,3-а]пиразин-3-ил)алкилкарбоновых кислот. Наш подход заключается в применении реакции ранее описанных 3-гидразинопиразин-2-онов с циклическими ангидридами дикарбоновых кислот, такими как янтарный или глутаровый ангидриды. Последующая циклизация проводилась в ДМФА при кипячении в течение 12 часов и привела к образованию 3-(7-арил-8-оксо-7,8-дигидро[1,2,4]-триазоло[4,3-а]пиразин-3-ил)пропановых или 4-(7-арил-8-оксо-7,8-дигидро[1,2,4]триазоло-[4,3-а]пиразин-3-ил)бутановых кислот с выходом 51-65%. Для синтеза амидов мы применили активацию карбоксильной группы в полученных кислотах посредством образования промежуточного имидазолиламида с помощью карбонилдиимидазола в безводном диоксане с дальнейшей реакцией как с алифатическими, так и с ароматическими аминами при кипячении в течение 12 часов. Выход полученных амидов составлял 50-92%. Строение полученных соединений доказано при помощи элементного анализа и данных ^{1}Н ЯМР-спектроскопии. Синтезированные соединения представляют определенный интерес как потенциальные фармакологические объекты, связанные с регуляцией липидного метаболизма и способностью влиять на уровень липидопротеинов, метаболизм пуринов и восприимчивость тканей к глюкозе.