

SUPPLEMENTARY MATERIAL TO
**Synthesis, characterization and biological evaluation of some
newer carbazole derivatives**

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ANALYTIC AND SPECTRAL DATA FOR THE PREPARED COMPOUNDS

5-[(9H-Carbazol-9-yl)methyl]-N-[(4-nitrophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4a**). Anal. Calcd. for $C_{26}H_{25}N_7O_3$: C, 64.58; H, 5.21; N, 20.28 %. Found: C, 64.57; H, 5.19; N, 20.25 %; IR (KBr, cm^{-1}) 3415, 3049, 2927, 2846, 1674, 1606, 1533, 1340, 1291, 1112, 837; 1H -NMR (300 MHz, $CDCl_3$, δ / ppm): 1.89 (1H, s, NH, D_2O exchangeable), 2.49 (4H, t, J = 4.5 Hz, CH_2), 2.67 (4H, t, J = 7.5 Hz, CH_2), 3.97 (1H, s, NH, D_2O exchangeable), 4.98 (1H, s, CH), 5.16 (2H, s, CH_2), 7.10 (2H, d, J = 6.0 Hz, Ar-H), 7.26 (3H, t, J = 9.0 Hz, Ar-H), 7.46 (3H, t, J = 7.5 Hz, Ar-H), 7.71 (2H, d, J = 15 Hz, Ar-H), 8.06 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, $CDCl_3$, δ / ppm): 146.9, 144.4, 130.9, 129.8, 122.2, 120.8, 118.9, 111.1, 77.9, 50.0, 46.3; MS-ESI (m/z (relative abundance, %)): 483.24 (M^+ , 100), 437.21 (29.9), 361.18 (22.2), 263.09 (16.6), 248.08 (38.0), 180.08 (14.4), 166.06 (13.3), 115.03 (6.0). UV (DMSO, λ_{max} / nm): 356.

4-[[5-[(9H-Carbazol-9-yl)methyl]-1,3,4-oxadiazol-2-yl]amino](piperazin-1-yl)methyl]phenol (**4b**). Anal. Calcd. for $C_{26}H_{26}N_6O_2$: C, 68.70; H, 5.77; N, 18.49 %. Found: C, 68.66; H, 5.75; N, 18.46 %; IR (KBr, cm^{-1}) 3642, 3414, 3046, 2921, 2856, 1670, 1600, 1335, 1155, 844; 1H -NMR (300 MHz, $CDCl_3$, δ / ppm): 1.97 (1H, s, NH, D_2O exchangeable), 2.45 (4H, t, J = 9.0 Hz, CH_2), 2.69 (4H, t, J = 6.0 Hz, CH_2), 4.09 (1H, s, NH, D_2O exchangeable), 4.91 (1H, s, OH, D_2O exchangeable), 5.15 (1H, s, CH), 5.29 (2H, s, CH_2), 6.74 (2H, d, J = 9.0 Hz, Ar-H), 6.95 (3H, t, J = 7.5 Hz, Ar-H), 7.14 (3H, t, J = 9.0 Hz, Ar-H), 7.37 (2H, d, J = 6.0 Hz, Ar-H), 7.56 (2H, d, J = 15 Hz, Ar-H); ^{13}C -NMR (75 MHz, $CDCl_3$, δ / ppm): 157.0, 130.9, 122.2, 120.1, 115.6, 111.1, 77.9, 58.1, 50.0, 46.3; MS-ESI (m/z (relative abundance, %)): 454.21 (M^+ , 100), 437.36 (27.8), 361.25 (21.7), 263.17 (17.1), 248.01 (40.3), 180.05 (13.8), 166.10 (14.1), 115.85 (4.2); UV (DMSO, λ_{max} / nm): 353.

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5-[(9H-Carbazol-9-yl)methyl]-N-[(piperazin-1-yl)(3,4,5-trimethoxyphenyl)-methyl]-1,3,4-oxadiazol-2-amine (**4c**). Anal. Calcd. for $C_{29}H_{32}N_6O_4$: C, 65.89; H, 6.10; N, 15.90 %. Found: C, 65.86; H, 6.07; N, 15.88 %; IR (KBr, cm^{-1}): 3413, 3047, 2908, 2812, 1661, 1601, 1323, 1236, 1166, 1068; 1H -NMR (300 MHz, $CDCl_3$, δ / ppm): 1.96 (1H, s, NH, D_2O exchangeable), 2.44 (4H, t, J = 7.5 Hz, CH_2), 2.68 (4H, t, J = 6.0 Hz, CH_2), 3.73 (9H, s, $(OCH_3)_3$), 4.13 (1H, s, NH, D_2O exchangeable), 4.99 (1H, s, CH), 5.18 (2H, s, CH_2), 6.06 (2H, d, J = 12 Hz, Ar-H), 6.10 (2H, d, J = 9.0 Hz, Ar-H), 6.96 (2H, d, J = 6.0 Hz, Ar-H), 7.19 (3H, t, J = 4.5 Hz, Ar-H), 7.46 (3H, t, J = 7.5 Hz, Ar-H); ^{13}C -NMR (75 MHz, $CDCl_3$, δ / ppm): 150.5, 137.7, 132.6, 130.9, 122.2, 120.1, 119.0, 111.1, 106.2, 78.5, 58.1, 56.23, 50.0, 46.3; MS-ESI (m/z (relative abundance, %)): 528.25 (M^+ , 100), 513.22 (34.2), 497.23 (30.6), 361.32 (24.3), 263.29 (15.9), 248.36 (36.6), 180.11 (15.8), 166.01 (13.1), 115.43 (3.9); UV (DMSO, λ_{max} / nm): 360.

5-[(9H-Carbazol-9-yl)methyl]-N-[(4-chlorophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4d**). Anal. Calcd. for $C_{26}H_{25}ClN_6O$: C, 66.03; H, 5.33; N, 17.77 %. Found: C, 66.01; H, 5.32; N, 17.74 %; IR (KBr, cm^{-1}): 3417, 3053, 2920, 2854, 1660, 1601, 1330, 1147, 1063, 852; 1H -NMR (300 MHz, $CDCl_3$, δ / ppm): 2.01 (1H, s, NH, D_2O exchangeable), 2.45 (4H, t, J = 6.0 Hz, CH_2), 2.63 (4H, t, J = 6.0 Hz, CH_2), 4.12 (1H, s, NH, D_2O exchangeable), 4.95 (1H, s, CH), 5.09 (2H, s, CH_2), 7.08 (2H, d, J = 9.0 Hz, Ar-H), 7.21 (3H, t, J = 7.5 Hz, Ar-H), 7.32 (3H, t, J = 9.0 Hz, Ar-H), 7.42 (2H, d, J = 6.0 Hz, Ar-H), 7.68 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, $CDCl_3$, δ / ppm): 136.4, 130.3, 122.2, 120.1, 118.9, 111.1, 77.9, 58.1, 50.0, 46.3; MS-ESI (m/z (relative abundance, %)): 472.18 (M^+ , 100), 437.12 (26.2), 361.22 (23.5), 263.18 (18.4), 248.17 (38.0), 180.33 (14.2), 166.23 (12.8), 115.33 (5.2); UV (DMSO, λ_{max} / nm): 338.

5-[(9H-Carbazol-9-yl)methyl]-N-[(4-(dimethylamino)phenyl)(piperazin-1-yl)-methyl]-1,3,4-oxadiazol-2-amine (**4e**). Anal. Calcd. for $C_{28}H_{31}N_7O$: C, 69.83; H, 6.49; N, 20.36 %. Found: C, 69.81; H, 6.46; N, 20.32 %; IR (KBr, cm^{-1}): 3412, 3040, 2919, 2851, 1666, 1598, 1323, 1159, 817; 1H -NMR (300 MHz, $CDCl_3$, δ / ppm): 1.90 (1H, s, NH, D_2O exchangeable), 2.32 (4H, t, J = 9.0 Hz, CH_2), 2.58 (4H, t, J = 7.5 Hz, CH_2), 2.85 (6H, s, $N(CH_3)_2$), 4.01 (1H, s, NH, D_2O exchangeable), 4.89 (1H, s, CH), 5.08 (2H, s, CH_2), 6.45 (2H, d, J = 6.0 Hz, Ar-H), 6.68 (3H, t, J = 10.5 Hz, Ar-H), 6.90 (3H, t, J = 3.0 Hz, Ar-H), 7.02 (2H, d, J = 6.0 Hz, Ar-H), 7.37 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, $CDCl_3$, δ / ppm): 148.1, 130.9, 129.8, 127.8, 122.2, 120.1, 118.9, 111.1, 58.1, 50.0, 46.3, 40.3; MS-ESI (m/z (relative abundance, %)): 481.25 (M^+ , 100), 466.23 (30.6), 437.20 (28.7), 361.14 (22.6), 263.22 (16.3), 248.13 (40.3), 180.23 (15.2), 166.05 (13.8), 115.28 (6.6); UV (DMSO, λ_{max} / nm): 351.

5-[(9H-Carbazol-9-yl)methyl]-N-[(2-nitrophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4f**). Anal. Calcd. for $C_{26}H_{25}N_7O_3$: C, 64.58; H, 5.21;

N, 20.28 %. Found: C, 64.54; H, 5.20; N, 20.27 %; IR (KBr, cm^{-1}) 3417, 3055, 2923, 2855, 1659, 1610, 1525, 1343, 1296, 1153, 740; ^1H -NMR (300 MHz, CDCl_3 , δ /ppm): 2.08 (1H, s, NH, D_2O exchangeable), 2.37 (4H, t, J = 7.5 Hz, CH_2), 2.66 (4H, t, J = 7.5 Hz, CH_2), 4.06 (1H, s, NH, D_2O exchangeable), 4.84 (1H, s, CH), 5.03 (2H, s, CH_2), 7.03 (2H, d, J = 9.0 Hz, Ar-H), 7.35 (3H, t, J = 7.5 Hz, Ar-H), 7.67 (3H, t, J = 7.5 Hz, Ar-H), 7.77 (2H, d, J = 9.0 Hz, Ar-H), 8.00 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, CDCl_3 , δ /ppm): 148.9, 131.4, 130.9, 122.2, 119.0, 118.9, 111.1, 69.3, 58.1, 50.1, 46.3; MS-ESI (m/z (relative abundance, %)): 483.78 (M^+ , 100), 437.21 (30.6), 361.26 (22.3), 263.01 (18.3), 248.02 (39.1), 180.14 (14.3), 166.26 (13.6), 115.13 (4.6); UV (DMSO, λ_{max} /nm): 352.

3-[[5-[(9H-Carbazol-9-yl)methyl]-1,3,4-oxadiazol-2-yl]amino](piperazin-1-yl)methyl]phenol (**4g**). Anal. Calcd. for $\text{C}_{26}\text{H}_{26}\text{N}_6\text{O}_2$: C, 68.70; H, 5.77; N, 18.49 %. Found: C, 68.69; H, 5.76; N, 18.48 %; IR (KBr, cm^{-1}): 3671, 3416, 3051, 2925, 2860, 1689, 1603, 1330, 1157, 738; ^1H -NMR (300 MHz, CDCl_3 , δ /ppm): 2.01 (1H, s, NH, D_2O exchangeable), 2.38 (4H, t, J = 7.5 Hz, CH_2), 2.68 (4H, t, J = 6.0 Hz, CH_2), 4.02 (1H, s, NH, D_2O exchangeable), 4.92 (1H, s, OH, D_2O exchangeable), 5.14 (1H, s, CH), 5.28 (2H, s, CH_2), 6.42 (2H, d, J = 6.0 Hz, Ar-H), 6.57 (3H, t, Ar-H, J = 7.5 Hz), 6.87 (3H, t, Ar-H, J = 10.5 Hz), 7.06 (2H, d, Ar-H, J = 6.0 Hz), 7.37 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, CDCl_3 , δ /ppm): 158.2, 139.7, 130.9, 122.2, 120.1, 118.9, 111.1, 78.2, 58.1, 46.3; MS-ESI (m/z (relative abundance, %)): 454.63 (M^+ , 100), 437.31 (31.2), 361.19 (20.4), 263.24 (14.2), 248.09 (35.8), 180.27 (19.2), 166.02 (12.6), 115.15 (7.1); UV (DMSO, λ_{max} /nm): 346.

5-[(9H-Carbazol-9-yl)methyl]-N-[(3-nitrophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4h**). Anal. Calcd. for $\text{C}_{26}\text{H}_{25}\text{N}_7\text{O}_3$: C, 64.58; H, 5.21; N, 20.28 %. Found: C, 64.55; H, 5.17; N, 20.24 %; IR (KBr, cm^{-1}) 3415, 3053, 2925, 2858, 1672, 1602, 1518, 1348, 1302, 1157, 676; ^1H -NMR (300 MHz, CDCl_3 , δ /ppm): 1.97 (1H, s, NH, D_2O exchangeable), 2.35 (4H, t, J = 10.5 Hz, CH_2), 2.66 (4H, t, J = 7.5 Hz, CH_2), 4.08 (1H, s, NH, D_2O exchangeable), 4.94 (1H, s, CH), 5.19 (2H, s, CH_2), 7.13 (2H, d, J = 6.0 Hz, Ar-H), 7.36 (3H, t, J = 10.5 Hz, Ar-H), 7.56 (3H, t, J = 7.5 Hz, Ar-H), 7.66 (2H, d, J = 6.0 Hz, Ar-H), 8.09 (2H, d, J = 6.0 Hz, Ar-H); ^{13}C -NMR (75 MHz, CDCl_3 , δ /ppm): 148.1, 139.3, 130.9, 124.1, 122.2, 120.1, 119.0, 111.1, 76.3, 58.1, 50.0, 46.3; MS-ESI (m/z (relative abundance, %)): 483.59 (M^+ , 100), 437.18 (27.4), 361.07 (21.6), 263.06 (18.3), 248.09 (38.3), 180.12 (13.4), 166.05 (12.2), 115.68 (6.8); UV (DMSO, λ_{max} /nm): 350.

2-[[5-[(9H-Carbazol-9-yl)methyl]-1,3,4-oxadiazol-2-yl]amino](piperazin-1-yl)methyl]phenol (**4i**). Anal. Calcd. for $\text{C}_{26}\text{H}_{26}\text{N}_6\text{O}_2$: C, 68.70; H, 5.77; N, 18.49 %. Found: C, 68.68; H, 5.74; N, 18.47 %, IR (KBr, cm^{-1}): 3691, 3415, 3053, 2924, 2853, 1668, 1606, 1333, 1149, 740; ^1H -NMR (300 MHz, CDCl_3 , δ /

/ ppm): 2.01 (1H, s, NH, D₂O exchangeable), 2.46 (4H, t, *J* = 7.5 Hz, CH₂), 2.67 (4H, t, *J* = 6.0 Hz, CH₂), 4.02 (1H, s, NH, D₂O exchangeable), 4.99 (1H, s, OH, D₂O exchangeable), 5.10 (1H, s, CH), 5.29 (2H, s, CH₂), 6.64 (2H, d, *J* = 9.0 Hz, Ar-H), 6.86 (3H, t, *J* = 6.0 Hz, Ar-H), 7.05 (3H, t, *J* = 12.0 Hz, Ar-H), 7.19 (2H, d, *J* = 9.0 Hz, Ar-H), 7.50 (2H, d, *J* = 9.0 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 136.8, 130.9, 119.0, 111.1, 79.3, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 454.02 (M⁺, 100), 437.31 (25.3), 361.23 (21.5), 263.12 (16.1), 248.06 (41.3), 180.31 (13.2), 166.08 (11.4), 115.06 (3.5); UV (DMSO, λ_{max} / nm): 340.

5-[(9H-Carbazol-9-yl)methyl]-N-[(3-chlorophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4j**). Anal. Calcd. for C₂₆H₂₅ClN₆O: C, 66.03; H, 5.33; N, 17.77 %. Found: C, 65.99; H, 5.31; N, 17.75 %; IR (KBr, cm⁻¹): 3415, 3050, 2912, 2827, 1649, 1581, 1307, 1151, 1080, 661; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 2.10 (1H, s, NH, D₂O exchangeable), 2.35 (4H, t, *J* = 7.5 Hz, CH₂), 2.58 (4H, t, *J* = 6.0 Hz, CH₂), 4.07 (1H, s, NH, D₂O exchangeable), 4.95 (1H, s, CH), 5.01 (2H, s, CH₂), 6.97 (2H, d, *J* = 9.0 Hz, Ar-H), 7.07 (3H, t, *J* = 6.0 Hz, Ar-H), 7.16 (3H, t, *J* = 7.5 Hz, Ar-H), 7.25 (2H, d, *J* = 6.0 Hz, Ar-H), 7.40 (2H, d, *J* = 6.0 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 139.4, 134.0, 130.9, 118.9, 111.1, 77.4, 58.3, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 472.91 (M⁺, 100), 437.16 (26.9), 361.29 (23.0), 263.13 (16.5), 248.23 (38.6), 180.38 (14.9), 166.20 (13.1), 115.13 (7.2); UV (DMSO, λ_{max} / nm): 333.

5-[(9H-Carbazol-9-yl)methyl]-N-[(2-chlorophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4k**). Anal. Calcd. for C₂₆H₂₅ClN₆O: C, 66.03; H, 5.33; N, 17.77 %. Found: C, 66.02; H, 5.30; N, 17.76 %; IR (KBr, cm⁻¹): 3428, 3056, 2941, 2847, 1652, 1580, 1348, 1148, 1056, 756; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 1.99 (1H, s, NH, D₂O exchangeable), 2.38 (4H, t, *J* = 7.5 Hz, CH₂), 2.60 (4H, t, *J* = 4.5 Hz, CH₂), 4.06 (1H, s, NH, D₂O exchangeable), 5.01 (1H, s, CH), 5.20 (2H, s, CH₂), 7.01 (2H, d, *J* = 6.0 Hz, Ar-H), 7.12 (3H, t, *J* = 4.5 Hz, Ar-H), 7.25 (3H, t, *J* = 7.5 Hz, Ar-H), 7.33 (2H, d, *J* = 6.0 Hz, Ar-H), 7.44 (2H, d, *J* = 9.0 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 138.4, 133.0, 129.9, 118.9, 111.1, 77.4, 58.3, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 472.59 (M⁺, 100), 437.14 (30.6), 361.34 (22.5), 263.20 (16.9), 248.11 (41.1), 180.46 (18.6), 166.12 (14.1), 115.06 (5.7); UV (DMSO, λ_{max} / nm): 330.

5-[(9H-Carbazol-9-yl)methyl]-N-[(3-methoxyphenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4l**). Anal. Calcd. for C₂₇H₂₈N₆O₂: C, 69.21; H, 6.02; N, 17.94 %. Found: C, 69.20; H, 6.00; N, 17.91 %; IR (KBr, cm⁻¹): 3415, 3060, 2931, 2844, 1639, 1579, 1320, 1242, 1124, 1037, 667; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 2.06 (1H, s, NH, D₂O exchangeable), 2.46 (4H, t, *J* = 6.0 Hz, CH₂), 2.70 (4H, t, *J* = 6.0 Hz, CH₂), 3.73 (3H, s, OCH₃), 4.06 (1H, s, NH, D₂O exchangeable), 4.95 (1H, s, CH), 5.15 (2H, s, CH₂), 6.61 (3H, t, *J* = 6.0 Hz,

Ar-H), 6.81 (2H, *d*, *J* = 3.0 Hz, Ar-H), 6.99 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.08 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.32 (3H, *t*, *J* = 13.5 Hz, Ar-H). ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 160.4, 130.5, 129.9, 118.9, 111.1, 77.4, 58.3, 55.9, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 468.23 (*M*⁺, 100), 453.20 (31.3), 437.48 (26.1), 361.10 (22.9), 263.25 (15.4), 248.29 (37.7), 180.14 (15.1), 166.19 (12.1), 115.11 (5.2); UV (DMSO, λ_{max} / nm): 328.

5-[(9H-Carbazol-9-yl)methyl]-N-[(4-methoxyphenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4m**). Anal. Calcd. for C₂₇H₂₈N₆O₂: C, 69.21; H, 6.02; N, 17.94 %. Found: C, 69.18; H, 6.01; N, 17.93 %; IR (KBr, cm⁻¹): 3416, 3053, 2935, 2839, 1645, 1595, 1323, 1251, 1161, 1016, 854; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 1.95 (1H, *s*, NH, D₂O exchangeable), 2.45 (4H, *t*, *J* = 12.0 Hz, CH₂), 2.64 (4H, *t*, *J* = 6.0 Hz, CH₂), 3.73 (3H, *s*, OCH₃), 4.08 (1H, *s*, NH, D₂O exchangeable), 4.89 (1H, *s*, CH), 5.20 (2H, *s*, CH₂), 6.67 (3H, *t*, *J* = 6.0 Hz, Ar-H), 6.89 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.05 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.14 (2H, *d*, *J* = 9.0 Hz, Ar-H), 7.34 (3H, *t*, *J* = 10.5 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 158.4, 131.9, 129.9, 118.9, 111.1, 77.4, 58.3, 55.9, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 468.73 (*M*⁺, 100), 453.20 (31.3), 437.48 (26.1), 361.10 (22.9), 263.25 (15.4), 248.29 (37.7), 180.14 (15.1), 166.19 (12.1), 115.11 (5.2); UV (DMSO, λ_{max} / nm): 330 nm.

5-[(9H-Carbazol-9-yl)methyl]-N-[(4-fluorophenyl)(piperazin-1-yl)methyl]-1,3,4-oxadiazol-2-amine (**4n**). Anal. Calcd. for C₂₆H₂₅FN₆O: C, 68.40; H, 5.52; N, 18.41 %. Found: C, 68.39; H, 5.49; N, 18.38 %; IR (KBr, cm⁻¹): 3417, 3051, 2933, 2843, 1653, 1575, 1334, 1257, 1151, 860; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 2.05 (1H, *s*, NH, D₂O exchangeable), 2.38 (4H, *t*, *J* = 7.5 Hz, CH₂), 2.63 (4H, *t*, *J* = 6.0 Hz, CH₂), 4.15 (1H, *s*, NH, D₂O exchangeable), 4.89 (1H, *s*, CH), 5.10 (2H, *s*, CH₂), 6.84 (2H, *d*, *J* = 9.0 Hz, Ar-H), 6.93 (3H, *t*, *J* = 7.5 Hz, Ar-H), 7.08 (3H, *t*, *J* = 6.0 Hz, Ar-H), 7.13 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.34 (2H, *d*, *J* = 9.0 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 161.4, 130.9, 120.9, 118.9, 111.1, 77.4, 58.3, 55.9, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 456.21 (*M*⁺, 100), 437.04 (27.3), 361.06 (22.1), 263.19 (15.4), 248.16 (39.3), 180.02 (16.3), 166.09 (12.8), 115.18 (7.6); UV (DMSO, λ_{max} / nm): 342.

5-[(9H-Carbazol-9-yl)methyl]-N-(phenyl(piperazin-1-yl)methyl)-1,3,4-oxadiazol-2-amine (**4o**). Anal. Calcd. for C₂₆H₂₆N₆O: C, 71.21; H, 5.98; N, 19.16 %. Found: C, 71.19; H, 5.95; N, 19.15 %; IR (KBr, cm⁻¹): 3410, 3045, 2931, 2832, 1678, 1604, 1325, 1157; ¹H-NMR (300 MHz, CDCl₃, δ / ppm): 2.08 (1H, *s*, NH, D₂O exchangeable), 2.42 (4H, *t*, *J* = 6.0 Hz, CH₂), 2.63 (4H, *t*, *J* = 7.5 Hz, CH₂), 4.08 (1H, *s*, NH, D₂O exchangeable), 5.01 (1H, *s*, CH), 5.21 (2H, *s*, CH₂), 7.02 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.17 (3H, *t*, *J* = 6.0 Hz, Ar-H), 7.24 (3H, *t*, *J* = 6.0 Hz, Ar-H), 7.32 (2H, *d*, *J* = 6.0 Hz, Ar-H), 7.41 (2H, *d*, *J* = 6.0 Hz, Ar-H); ¹³C-NMR (75 MHz, CDCl₃, δ / ppm): 138.6, 130.9, 128.9, 120.5, 118.9, 111.1, 77.4, 58.3, 55.9, 50.0, 46.3; MS-ESI (*m/z* (relative abundance, %)): 438.22 (*M*⁺, 100),

361.40 (22.4), 263.01 (16.5), 248.10 (38.0), 180.05 (17.4), 166.06 (13.2), 115.71 (5.5); UV (DMSO, λ_{max} / nm): 320.