SUPPORTING INFORMATION

Design, synthesis and evaluation of seleno-dihydropyrimidinones as potential multi-targeted therapeutics for Alzheimer’s disease


[a] Laboratório de Síntese de Substâncias de Selênio Bioativas
CFM/Departamento de Química/Universidade Federal de Santa Catarina - Florianópolis – SC-Brazil

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1H NMR, 13C NMR and HMRS Spectrum of Synthesized Compounds
S4-S17
2-Oxo-4-phenyl-6-selenocyanatomethyl-1,2,3,4-tetrahydro- pyrimidine-5-carboxylic acid ethyl ester (1a): white solid, m.p. = 162°C; IR (ν, cm⁻¹): 3396, 3219, 2149, 1703, 1675; ¹H NMR (CDCl₃, 200MHz): δ (ppm) 1.10 (t, J = 7.09 Hz, 3H), 3.06 - 4.10 (m, 3H), 4.34 (d, J = 11.98 Hz, 1H), 5.18 (d, J = 2.69 Hz, 1H), 7.26 - 7.34 (m, 5H), 7.91 (s, 1H), 9.42 (s, 1H); ¹³C NMR (CDCl₃, 200MHz): δ (ppm) 13.8, 25.8, 53.9, 60.0, 100.4, 103.8, 126.4, 127.6, 128.5, 144.0, 148.3, 151.7, 165.2; HRMS (APPI-QTOF) m/z calcd. for C₁₅H₁₄N₃O₃Se [M+H]: 366.0352; found 366.0354.

2-Oxo-6-selenocyanatomethyl-4-o-tolyl-1,2,3,4-tetrahydro- pyrimidine-5-carboxylic acid ethyl ester (1b): slightly yellow solid, m.p. = 178°C; IR (ν, cm⁻¹): 3343, 3219, 2150, 1706, 1670; ¹H NMR (CDCl₃, 400MHz): δ (ppm) 1.02 (t, J = 7.03 Hz, 3H), 2.39 (s, 3H), 3.96 – 4.11 (m, 4H), 5.61 (s, 1H), 6.57 (s, 1H), 7.10 – 7.21 (m, 3H), 7.29 (d, J = 7.42 Hz, 1H); ¹³C NMR (CDCl₃, 100MHz): δ (ppm) 13.7, 18.8, 26.7, 51.5, 60.6, 101.2, 103.7, 126.8, 127.3, 127.9, 130.5, 134.7, 140.8, 147.3, 152.8, 165.6; HRMS (APPI-QTOF) calcd. for C₁₆H₁₇N₃O₃Se [M+H]: 380.0509; found 380.0512.

2-Oxo-6-selenocyanatomethyl-4-p-tolyl-1,2,3,4-tetrahydro- pyrimidine-5-carboxylic acid ethyl ester (1c): slightly yellow solid, m.p. = 152°C; IR (ν, cm⁻¹): 3342, 2153, 1730, 1675; ¹H NMR (CDCl₃, 200MHz): δ (ppm) 1.14 (t, J = 7.07 Hz, 3H), 2.97 (s, 3H), 3.97 – 4.12 (m, 4H), 5.32 (d, J = 3.03 Hz, 1H), 6.67 (s, 1H), 7.10 (d, J = 8.59 Hz, 2H), 7.20 (d, J = 8.59 Hz, 2H), 9.55 (s, 1H); ¹³C NMR (DMSO-d₆, 50MHz): δ (ppm) 13.8, 20.9, 26.6, 54.7, 60.6, 101.8, 103.5, 126.5, 129.25, 137.7, 139.9, 146.6, 153.5, 165.5; HRMS (APPI-QTOF) calcd. for C₁₆H₁₇N₃O₃Se [M+H]: 380.0509; found 380.0510.

4-(2-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4- tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1d): slightly yellow solid, m.p. = 140°C; IR (ν, cm⁻¹): 3359, 3225, 2154, 1714, 1677; ¹H NMR (CDCl₃, 200MHz): δ (ppm) 1.07 (t, J = 7.34 Hz, 3H), 3.86 (s, 3H), 3.99 – 4.08 (m, 3H), 4.22 (d, J = 12.23 Hz, 1H), 5.70 (d, J = 2.45 Hz, 1H), 6.07 (s, 1H), 6.87 – 6.93 (m, 2H), 7.10 (d, J = 5.87 Hz, 1H), 7.27 (t, J = 7.83 Hz, 1H), 9.58 (s, 1H); ¹³C NMR (CDCl₃, 50MHz): δ (ppm) 13.9, 26.8, 50.5, 55.3, 60.6, 99.3, 103.2, 110.7, 120.5, 127.1, 129.2, 129.4, 148.3, 153.6, 156.9, 165.8; HRMS (APPI-QTOF) calcd. for C₁₆H₁₇N₃O₄Se [M+H]: 396.0458; found 396.0461.

4-(4-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4- tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1e): slightly yellow solid, m.p. = 155°C; IR (ν, cm⁻¹): 3353, 3225, 2154, 1714, 1677; ¹H NMR (CDCl₃, 200MHz): δ (ppm) 1.15 (t, J = 7.03 Hz, 3H), 3.78 (s, 3H), 4.03 – 4.09 (m, 4H), 5.32 (s, 1H), 6.26 (s, 1H), 6.85 (d, J = 8.60
4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1f): slightly yellow solid, m.p. = 166°C; IR (ν, cm⁻¹): 3427, 3320, 2151, 1722, 1684; ¹H NMR (DMSO-d6, 200 MHz): δ (ppm) 1.17(t, J=7.07Hz, 3H), 3.96 – 4.07 (m, 3H), 4.23 (d, J = 12,13 Hz, 1H), 5.38 (d, J = 3.03 Hz, 1H), 7.42 – 7.51 (m, 2H), 7.65 (m, 1H), 8.05-8.14 (m, 2H), 8.14 (s, 1H), 9.67 (s, 1H); ¹³C NMR (DMSO-d6, 100MHz): δ (ppm) 13.6, 30.4, 53.4, 60.0, 99.3, 102.8, 121.2, 122.2, 129.7, 132.7, 146.0, 147.7, 149.1, 151.4, 164.7; HRMS (APPI-QTOF) calcd. for C_{15}H_{14}N_{4}O_{5}Se [M+H]: 411.0203; found 411.0208.

1-Methyl-4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1g): slightly yellow solid, m.p. = 173°C; IR (ν, cm⁻¹): 3432, 3263, 2139, 1699, 1673; ¹H NMR (DMSO-d6, 200 MHz): δ (ppm) 1.14(t, J = 7.09 Hz, 3H), 3.30 (s, 3H), 4.07 (q, J = 7.09 Hz, 2H), 4.33 (s, 2H), 5.39 (d, J = 3.91 Hz, 1H), 7.42 – 7.61 (m, 2H), 7.95 (d, J = 3.67 Hz, 1H), 8.03 – 8.13 (m, 2H); ¹³C NMR (DMSO-d6, 100MHz): δ (ppm) 13.7, 24.6, 29.5, 51.6, 60.4, 103.2, 103.8, 129.7, 132.5, 145.2, 147.7, 150.1, 152.6, 164.9; HRMS (APPI-QTOF) calcd. for C_{16}H_{16}N_{4}O_{5}Se [M+H]: 425.0359; found 425.0364.
Selected Spectra

Figure 1. $^1$H NMR Spectrum (200 MHz, CDCl$_3$) of 2-Oxo-4-phenyl-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1a)

Figure 2. Expansion of $^1$HNMR of compound 1a
Figure 3. $^{13}$C NMR (50 MHz, DMSO-d$_6$) Spectrum of 2-Oxo-4-phenyl-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1a)

Figure 4. HRMS Spectrum of 2-Oxo-4-phenyl-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1a)
Figure 5. $^1$H NMR Spectrum (400 MHz, CDCl$_3$) of 2-Oxo-6-selenocyanatomethyl-4-o-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1b)

Figure 6. Expansion of $^1$HNMR of compound 1b
Figure 7. $^{13}$C NMR Spectrum (100 MHz, CDCl$_3$) of 2-Oxo-6-selenocyanatomethyl-4-o-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1b)

Figure 8. HRMS Spectrum of 2-Oxo-6-selenocyanatomethyl-4-o-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1b)
Figure 9. $^1$H NMR Spectrum (200 MHz, CDCl$_3$) of 2-Oxo-6-selenocyanomethyl-4-p-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1c)

Figure 10. Expansion of $^1$HNMR of compound 1c
Figure 11. $^{13}$C NMR Spectrum (50 MHz, DMSO-d6) of 2-Oxo-6-selenocyanatomethyl-4-p-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1c)

Figure 12. HRMS Spectrum of 2-Oxo-6-selenocyanatomethyl-4-p-tolyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1c)
**Figure 13.** $^1$H NMR Spectrum (200 MHz, CDCl$_3$) of 4-(2-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1d)

**Figure 14.** Expansion of $^1$HNMR of compound 1d
Figure 15. $^{13}$C NMR Spectrum (50 MHz, CDCl$_3$) of 4-(2-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1d)

Figure 16. HRMS Spectrum of 4-(2-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1d)
Figure 17. $^1$H NMR Spectrum (400 MHz, CDCl$_3$) of 4-(4-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1e)

Figure 18. Expansion of $^1$HNMR of compound 1e
Figure 19. $^{13}$C NMR Spectrum (100 MHz, DMSO-d$_6$) of 4-(4-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1e)

Figure 20. HRMS Spectrum of 4-(4-Methoxy-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1e)
Figure 21. $^1$H NMR Spectrum (200 MHz, DMSO-d6) of 4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1f)

Figure 22. Expansion of $^1$HNMR of compound 1f
Figure 23. $^{13}$C NMR Spectrum (100 MHz, DMSO-d6) of 4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1f)

Figure 24. HRMS Spectrum of 4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1f)
Figure 25. $^1$H NMR Spectrum (200 MHz, DMSO-d6) of 1-Methyl-4-(3-Nitrophenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1g)

Figure 26. Expansion of $^1$H NMR of compound 1g
Figure 27. $^{13}$C NMR Spectrum (100 MHz, DMSO-d6) of 1-Methyl-4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1g)

Figure 28. HRMS Spectrum of 1-Methyl-4-(3-Nitro-phenyl)-2-oxo-6-selenocyanatomethyl-1,2,3,4-tetrahydro-pyrimidine-5-carboxylic acid ethyl ester (1g)