Supporting Information

^{1}H NMR and HRMS Data

Metal Coordination Based Inhibitors of Adenylyl Cyclase: Novel Potent P-Site Antagonists.

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(1R, 3S)-1-Hydroxy-3-(tert-Butyl-dimethylsiloxy)-4-cyclopentene (2).

(1R, 3S)-1-Acetoxy-3-hydroxy-4-cyclopentene, **1**, was subjected to general procedure F. Yield = 100%. TLC: R_f = 0.48 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 1.55 (m, 1H), 2.00 (s, 3H), 2.80 (m, 1H), 4.70 (m, 1H), 5.45 (m, 1H), 5.85 (m, 1H), 5.95 (m, 1H). Subsequent subjection of the product to general procedure C gave compound **2**. Yield = 90%. TLC: R_f = 0.43 (25% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 1.50 (m, 1H), 2.65 (m, 1H), 4.55 (m, 1H), 4.65 (m, 1H), 5.85 (m, 1H), 5.95 (m, 1H).

(1R, 3R)-1-(tert-Butyl-dimethylsiloxy)-3-hydroxy-4-cyclopentene (16).

Compound **2** was subjected to general procedure H. Yield = 81%. TLC: R_f = 0.50 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 2.20 (m, 1H), 2.30 (m, 1H), 5.10 (s, 1H), 6.05 (m, 2H), 6.10 (m, 1H), 8.20 (d, 2H), 8.30 (d, 2H). Subsequent subjection of the product to general procedure C gave compound **16**. Yield = 85%. TLC: R_f = 0.33 (25% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 2.05 (m, 2H), 5.00 (m, 1H), 5.05 (m, 1H), 5.95 (m, 2H).

(1S, 3R)-1-Hydroxy-3-triphenylmethoxy-4-cyclopentene (12).

Compound **2** was subjected to general procedure M. TLC: R_f = 0.27 (Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.00 (s, 6H), 1.85 (s, 9H), 1.55 (m, 1H), 2.15 (m, 1H), 4.35 (m, 2H), 4.95 (m, 1H), 5.60 (m, 1H), 7.20 (m, 3H), 7,25 (m, 6H), 7.50 (d, 6H). Subsequent subjection of the product to general procedure I gave compound **12**. Yield = 87% (2 steps). TLC: R_f = 0.32 (25% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.40 (m,

1H), 2.20 (m, 1H), 4.35 (m, 1H), 4.45 (m, 1H), 5.15 (m, 1H), 5.75 (m, 1H), 7.20 (m, 3H), 7,25 (t, 6H), 7.50 (d, 6H).

(1R, 3R)-1-Chloro-3-triphenylmethoxy-4-cyclopentene (13).

^{1}H NMR (400 MHz, $CDCl_3$): δ 2.00 (m, 1H), 2.15 (m, 1H), 4.95 (m, 2H), 5.15 (m, 1H), 5.80 (m, 1H), 7.20 (m, 3H), 7.25 (t, 6H), 7.50 (d, 6H).

(1S, 3R)-1-(2-Dimethylmalonyl)-3-triphenylmethoxy-4-cyclopentene (14).

^{1}H NMR (400 MHz, $CDCl_3$): δ 1.35 (m, 1H), 2.05 (m, 1H), 3.00 (m, 1H), 3.30 (d, 1H), 3.70 (s, 6H), 4.60 (m, 1H), 4.90 (m, 1H), 5.60 (m, 1H), 7.20 (m, 3H), 7.25 (t, 6H), 7.45 (d, 6H).

(1R, 3R)-1-Hydroxy-3-(methyl-carboxymethyl)-4-cyclopentene (15).

Compound **14** was subjected to general procedure L. Yield = 80%. TLC: R_f = 0.45 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.30 (m, 1H), 2.10 (m, 1H), 2.35 (m, 1H), 2.45 (m, 1H), 2.75 (m, 1H), 3.65 (s, 3H), 4.60 (m, 1H), 4.85 (m, 1H), 5.60 (m, 1H), 7.20 (m, 3H), 7.25 (t, 6H), 7.45 (d, 6H). Subsequent subjection of the product to general procedure N gave compound **15**. Yield = 39%. TLC: R_f = 0.38 (50% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.40 (m, 1H), 2.45 (m, 2H), 2.55 (m, 1H), 2.95 (m, 1H), 3.65 (s, 3H), 4.80 (m, 1H), 5.85 (m, 2H).

(1S, 3R)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)-4-cyclopentene (6b).

^{1}H NMR (400 MHz, DMSO): δ 2.30 (m, 2H), 2.60 (m, 2H), 3.50 (m, 1H), 3.75 (s, 3H), 5.75 (m, 1H), 6.05 (m, 1H), 6.30 (m, 1H), 7.40 (s, 2H), 8.10 (s, 1H), 8.25 (s, 1H).

(1S, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)-4-cyclopentene (7b).

^{1}H NMR (400 MHz, DMSO): δ 2.20 (m, 2H), 2.30 (m, 2H), 5.70 (m, 1H), 6.00 (m, 1H), 6.30 (m, 1H), 7.30 (s, 2H), 8.10 (s, 1H), 8.25 (s, 1H), 8.90 (s, 1H), 10.55 (s, 1H). HRMS: calcd ($C_{12}H_{14}N_6O_2$) *m/z* 275.1257 ($M^+ + 1$), found 275.1254 ($M^+ + 1$).

(1S, 3R)-1-(9-Adenenyl)-3-carboxymethyl-4-cyclopentene (8b).

^{1}H NMR (400 MHz, DMSO): δ 2.20-2.40 (m, 4H), 3.45 (m, 1H), 5.70 (m, 1H), 6.00 (m, 1H), 6.30 (m, 1H), 7.30 (s, 2H), 8.10 (s, 1H), 8.20 (s, 1H).

(1R, 3R)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)cyclopentane (9b).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.20 (m, 2H), 2.30 (m, 2H), 2.55 (d, 2H), 2.75 (m, 1H), 3.75 (s, 3H), 5.05 (m, 1H), 7.35 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1R, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)cyclopentane (10b).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.15 (d, 2H), 2.20 (m, 3H), 2.35 (m, 1H), 2.70 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H), 8.85 (s, 1H), 10.50 (s, 1H). HRMS: calcd ($C_{12}H_{16}N_6O_2$) *m/z* 277.1413 ($M^+ + 1$), found 277.1419 ($M^+ + 1$).

(1R, 3R)-1-(9-Adenenyl)-3-carboxymethylcyclopentane (11b).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.15-2.40 (m, 4H), 2.45 (d, 2H), 2.70 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1S, 3S)-1-Chloro-3-(tert-Butyl-dimethylsiloxy)-4-cyclopentene (3).

^{1}H NMR (400 MHz, $CDCl_3$): δ 0.10 (s, 6H), 0.90 (s, 9H), 2.15 (m, 1H), 2.50 (m, 1H), 5.05 (m, 1H), 5.15 (m, 1H), 5.95 (m, 2H).

(1R, 3S)-1-(2-Dimethylmalonyl)-3-(tert-Butyl-dimethylsiloxy)-4-cyclopentene (4).

^{1}H NMR (400 MHz, $CDCl_3$): δ 0.10 (s, 6H), 0.90 (s, 9H), 1.40 (m, 1H), 2.40 (m, 1H), 3.20 (m, 1H), 3.35 (m, 1H), 3.75 (s, 6H), 4.80 (m, 1H), 5.80 (m, 2H).

(1S, 3S)-1-Hydroxy-3-(methyl-carboxymethyl)-4-cyclopentene (5).

Compound **4** was subjected to general procedure L. Yield = 75%. TLC: R_f = 0.57 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 1.30 (m, 1H), 2.35 (m, 1H), 2.45 (m, 2H), 2.90 (m, 1H), 3.65 (s, 3H), 4.80 (m, 1H), 5.75 (m, 1H), 5.80 (m, 1H). Subsequent subjection of the product to general procedure G gave compound **5**. Yield = 61%. TLC: R_f = 0.39 (50% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.40 (m, 1H), 2.25 (m, 2H), 2.35 (m, 1H), 2.95 (m, 1H), 3.65 (s, 3H), 4.80 (m, 1H), 5.85 (m, 2H).

(1R, 3S)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)-4-cyclopentene (6a).

^{1}H NMR (400 MHz, DMSO): δ 2.30 (m, 2H), 2.60 (m, 2H), 3.75 (s, 3H), 5.75 (m, 1H), 6.05 (m, 1H), 6.30 (m, 1H), 7.30 (s, 2H), 8.10 (s, 1H), 8.25 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)-4-cyclopentene (7a).

^{1}H NMR (400 MHz, DMSO): δ 2.20 (m, 2H), 2.30 (m, 2H), 5.70 (m, 1H), 6.00 (m, 1H), 6.30 (m, 1H), 7.30 (s, 2H), 8.10 (s, 1H), 8.25 (s, 1H), 9.10 (s, 1H), 10.60 (s, 1H). HRMS: calcd ($C_{12}H_{14}N_6O_2$) *m/z* 275.1257 ($M^+ + 1$), found 275.1261 ($M^+ + 1$).

(1R, 3S)-1-(9-Adenenyl)-3-carboxymethyl-4-cyclopentene (8a).

^{1}H NMR (400 MHz, DMSO): δ 2.20-2.40 (m, 4H), 4.15 (m, 1H), 5.70 (m, 1H), 5.95 (m, 1H), 6.30 (m, 1H), 7.30 (s, 2H), 8.10 (s, 1H), 8.20 (s, 1H).

(1S, 3S)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)cyclopentane (9a).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.20 (m, 2H), 2.30 (m, 2H), 2.55 (d, 2H), 2.75 (m, 1H), 3.75 (s, 3H), 5.05 (m, 1H), 7.35 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1S, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)cyclopentane (10a).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.15 (d, 2H), 2.20 (m, 3H), 2.35 (m, 1H), 2.70 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.15 (s, 1H), 8.35 (s, 1H), 8.85 (s, 1H), 10.50 (s, 1H). HRMS: calcd ($C_{12}H_{16}N_6O_2$) *m/z* 277.1413 ($M^+ + 1$), found 277.1419 ($M^+ + 1$).

(1S, 3S)-1-(9-Adenenyl)-3-carboxymethylcyclopentane (11a).

^{1}H NMR (400 MHz, DMSO): δ 1.45 (m, 1H), 1.95 (m, 1H), 2.15-2.40 (m, 4H), 2.45 (d, 2H), 2.70 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1R, 3S)-1-Chloro-3-(tert-Butyl-dimethylsiloxy)-4-cyclopentene (17).

^{1}H NMR (400 MHz, $CDCl_3$): δ 0.10 (s, 6H), 0.90 (s, 9H), 1.95 (m, 1H), 2.90 (m, 1H), 4.75 (m, 2H), 5.90 (m, 2H).

(1S, 3S)-1-(2-Dimethylmalonyl)-3-(tert-Butyl-dimethylsiloxy)-4-cyclopentene (18).

^{1}H NMR (400 MHz, $CDCl_3$): δ 0.05 (s, 6H), 0.90 (s, 9H), 1.95 (m, 2H), 3.20 (d, 1H), 3.55 (m, 1H), 3.75 (s, 6H), 4.90 (m, 1H), 5.80 (m, 2H).

(1S, 3R)-1-Hydroxy-3-(methyl-carboxymethyl)-4-cyclopentene (19).

Compound **18** was subjected to general procedure L. Yield = 74%. TLC: R_f = 0.58 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, DMSO): δ 0.20 (s, 6H), 0.95 (s, 9H), 1.80 (m, 1H), 1.95 (m, 1H), 2.40 (m, 1H), 2.45 (m, 1H), 3.20 (m, 1H), 3.70 (s, 3H), 5.00 (m, 1H), 5.85 (m, 1H), 5.95 (m, 1H). Subsequent subjection of the product to general procedure I gave compound **19**. Yield = 59%. TLC: R_f = 0.40 (50% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.85 (m, 1H), 2.00 (m, 1H), 2.35 (m, 2H), 3.30 (m, 1H), 3.65 (s, 3H), 4.90 (m, 1H), 5.85 (m, 1H), 5.95 (m, 1H).

(1R, 3R)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)-4-cyclopentene (6c).

^{1}H NMR (400 MHz, DMSO): δ 1.75 (m, 1H), 2.62 (m, 1H), 2.75 (m, 1H), 2.95 (m, 1H), 3.25 (m, 1H), 3.75 (s, 3H), 5.70 (m, 1H), 6.05 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.20 (s, 1H), 8.25 (s, 1H).

(1R, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)-4-cyclopentene (7c) and (1R, 3R)-1-(9-Adenenyl)-3-carboxymethyl-4-cyclopentene (8c).

Hydroxamic acid **(7c)**: ^{1}H NMR (400 MHz, DMSO): δ 1.75 (m, 1H), 2.20 (m, 1H), 2.35 (m, 1H), 2.90 (m, 1H), 3.25 (m, 1H), 5.70 (m, 1H), 6.05 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H), 9.10 (s, 1H), 10.60 (s, 1H). HRMS: calcd ($C_{12}H_{14}N_6O_2$) *m/z* 275.1257 ($M^+ + 1$), found 275.1257 ($M^+ + 1$). Carboxylic acid **(8c)**: ^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 2.20 (m, 1H), 2.30 (m, 1H), 2.90 (m, 1H), 3.20 (m, 1H), 5.65 (m, 1H), 6.00 (m, 1H), 6.35 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H).

(1S, 3R)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)cyclopentane (9c).

^{1}H NMR (400 MHz, DMSO): δ 1.72 (m, 1H), 1.88 (m, 1H), 2.04 (m, 1H), 2.16 (m, 1H), 2.28 (m, 1H), 2.46 (m, 2H), 3.70 (s, 3H), 4.95 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1S, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)cyclopentane (10c) and (1S, 3R)-1-(9-Adenenyl)-3-carboxymethylcyclopentane (11c).

Hydroxamic acid **(10c)**: ^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 1.85 (m, 1H), 2.00 (m, 1H), 2.20 (m, 1H), 2.25 (m, 2H), 2.30 (m, 1H), 2.45 (m, 2H), 5.00 (m, 1H), 8.45 (s,

1H), 8.55 (s, 1H). HRMS: calcd ($C_{12}H_{16}N_6O_2$) *m/z* 277.1413 ($M^+ + 1$), found 277.1421 ($M^+ + 1$). Carboxylic acid **(11c)**: ^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 1.85 (m, 1H), 2.05 (m, 1H), 2.15 (m, 1H), 2.30 (m, 1H), 2.45 (m, 1H), 2.50 (m, 3H), 5.05 (m, 1H), 8.50 (s, 1H), 8.60 (s, 1H).

(1R, 3R)-1-Hydroxy-3-triphenylmethoxy-4-cyclopentene (20).

Compound **12** was subjected to general procedure H. TLC: R_f = 0.36 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, DMSO): δ 2.00 (m, 1H), 2.15 (m, 1H), 4.95 (m, 1H), 5.40 (m, 1H), 5.95 (m, 1H), 6.05 (m, 1H), 7.30-7.60 (m, 15H), 8.20 (d, 2H), 8.40 (d, 2H). Subsequent subjection of the product to general procedure C gave compound **20**. Yield = 77% (2 steps). TLC: R_f = 0.32 (25% EtOAc/Hexane). ^{1}H NMR (400 MHz, DMSO): δ 1.55 (m, 1H), 1.80 (m, 1H), 4.70 (m, 1H), 4.80 (m, 1H), 5.10 (m, 1H), 5.80 (m, 1H), 7.40 (m, 3H), 7.45 (m, 6H), 7.55 (m, 6H).

(1S, 3R)-1-Chloro-3-triphenylmethoxy-4-cyclopentene (21).

^{1}H NMR (400 MHz, $CDCl_3$): δ 1.90 (m, 1H), 2.40 (m, 1H), 4.55 (m, 2H), 5.20 (m, 1H), 5.75 (m, 1H), 7.20 (m, 3H), 7.25 (t, 6H), 7.50 (d, 6H).

(1R, 3R)-1-(2-Dimethylmalonyl)-3-triphenylmethoxy-4-cyclopentene (22).

^{1}H NMR (400 MHz, DMSO): δ 1.60 (m, 1H), 1.80 (m, 1H), 3.70 (s, 3H), 3.71 (s, 3H), 4.70 (m, 1H), 5.00 (m, 1H), 5.75 (m, 1H), 7.40 (m, 3H), 7.45 (t, 6H), 7.55 (d, 6H).

(1R, 3S)-1-Hydroxy-3-(methyl-carboxymethyl)-4-cyclopentene (23).

Compound **22** was subjected to general procedure L. Yield = 63%. TLC: R_f = 0.45 (10% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.45 (m, 1H), 1.90 (m, 1H), 2.15 (m, 2H), 3.15 (m, 1H), 3.60 (s, 3H), 4.70 (m, 1H), 4.80 (m, 1H), 5.70 (m, 1H), 7.20 (m, 3H), 7.25 (t, 6H), 7.45 (d, 6H). Subsequent subjection of the product to general procedure N gave compound **23**. Yield = 54%. TLC: R_f = 0.35 (50% EtOAc/Hexane). ^{1}H NMR (400 MHz, $CDCl_3$): δ 1.40 (m, 1H), 1.85 (m, 1H), 2.00 (m, 1H), 2.35 (m, 2H), 3.30 (m, 1H), 3.65 (s, 3H), 4.85 (m, 1H), 5.85 (m, 1H), 5.95 (m, 1H).

(1S, 3S)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)-4-cyclopentene (6d).

^{1}H NMR (400 MHz, DMSO): δ 1.75 (m, 1H), 2.62 (m, 1H), 2.75 (m, 1H), 2.95 (m, 1H), 3.25 (m, 1H), 3.75 (s, 3H), 5.70 (m, 1H), 6.05 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.20 (s, 1H), 8.25 (s, 1H).

(1S, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)-4-cyclopentene (7d).

^{1}H NMR (400 MHz, DMSO): δ 1.75 (m, 1H), 2.20 (m, 1H), 2.35 (m, 1H), 2.90 (m, 1H), 3.25 (m, 1H), 5.70 (m, 1H), 6.05 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H), 8.90 (s, 1H), 10.50 (s, 1H). HRMS: calcd ($C_{12}H_{14}N_6O_2$) *m/z* 275.1257 (M^+ + 1), found 275.1252 (M^+ + 1).

(1S, 3S)-1-(9-Adenenyl)-3-carboxymethyl-4-cyclopentene (8d).

^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 2.30 (m, 1H), 2.45 (m, 1H), 2.90 (m, 1H), 3.20 (m, 1H), 5.65 (m, 1H), 6.00 (m, 1H), 6.25 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-(methyl-carboxymethyl)cyclopentane (9d).

^{1}H NMR (400 MHz, DMSO): δ 1.72 (m, 1H), 1.88 (m, 1H), 2.04 (m, 1H), 2.16 (m, 1H), 2.28 (m, 1H), 2.46 (m, 2H), 2.62 (m, 2H), 3.70 (s, 3H), 4.95 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoylmethyl)cyclopentane (10d).

^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 1.85 (m, 1H), 2.00 (m, 1H), 2.20 (m, 1H), 2.25 (m, 2H), 2.30 (m, 1H), 2.45 (m, 2H), 4.95 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H), 8.85 (bs, 1H), 10.50 (bs, 1H). HRMS: calcd ($C_{12}H_{16}N_6O_2$) *m/z* 277.1413 (M^+ + 1), found 277.1417 (M^+ + 1).

(1R, 3S)-1-(9-Adenenyl)-3-carboxymethylcyclopentane (11d).

^{1}H NMR (400 MHz, DMSO): δ 1.70 (m, 1H), 1.85 (m, 1H), 2.05 (m, 1H), 2.15 (m, 1H), 2.30 (m, 1H), 2.45 (m, 4H), 4.95 (m, 1H), 7.35 (s, 2H), 8.20 (s, 1H), 8.35 (s, 1H).

(1S, 3R)-Methyl-1-aminocyclopent-4-ene-3-carboxylate hydrochloride (25a).

^{1}H NMR (400 MHz, DMSO): δ 2.05 (m, 1H), 2.65 (m, 1H), 3.80 (s, 3H), 3.85 (m, 1H), 4.30 (m, 1H), 6.00 (m, 1H), 6.20 (m, 1H), 8.40 (bs, 3H).

(1R, 3S)-Methyl-1-aminocyclopent-4-ene-3-carboxylate hydrochloride (25b).

^{1}H NMR (400 MHz, DMSO): δ 2.05 (m, 1H), 2.65 (m, 1H), 3.80 (s, 3H), 3.85 (m, 1H), 4.30 (m, 1H), 6.00 (m, 1H), 6.20 (m, 1H), 8.40 (bs, 3H).

(1S, 3R)-1-[9-(1-Chloroadenenyl)]-3-methylcarboxy-4-cyclopentene (26a).

^{1}H NMR (400 MHz, DMSO): δ 2.35 (m, 1H), 3.00 (m, 1H), 3.80 (s, 3H), 3.95 (m, 1H), 5.90 (m, 1H), 6.25 (m, 1H), 6.40 (m, 1H), 8.65 (s, 1H), 8.90 (s, 1H).

(1R, 3S)-1-[9-(1-Chloroadenenyl)]-3-methylcarboxy-4-cyclopentene (26b).

^{1}H NMR (400 MHz, DMSO): δ 2.35 (m, 1H), 3.00 (m, 1H), 3.80 (s, 3H), 3.95 (m, 1H), 5.90 (m, 1H), 6.25 (m, 1H), 6.40 (m, 1H), 8.65 (s, 1H), 8.90 (s, 1H).

(1S, 3R)-1-[9-(1-Azidoadenenyl)]-3-methylcarboxy-4-cyclopentene (27a).

^{1}H NMR (400 MHz, DMSO): δ 2.40 (m, 1H), 3.05 (m, 1H), 3.80 (s, 3H), 4.00 (m, 1H), 6.00 (m, 1H), 6.30 (m, 1H), 6.45 (m, 1H), 8.60 (m, 1H), 10.25 (s, 1H).

(1R, 3S)-1-[9-(1-Azidoadenenyl)]-3-methylcarboxy-4-cyclopentene (27b).

^{1}H NMR (400 MHz, DMSO): δ 2.40 (m, 1H), 3.05 (m, 1H), 3.80 (s, 3H), 4.00 (m, 1H), 6.00 (m, 1H), 6.30 (m, 1H), 6.45 (m, 1H), 8.60 (m, 1H), 10.25 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-methylcarboxycyclopentane (29a).

^{1}H NMR (400 MHz, DMSO): δ 2.20 (m, 3H), 2.30 (m, 1H), 2.40 (m, 1H), 2.55 (m, 1H), 3.15 (m, 1H), 3.80 (s, 3H), 5.00 (m, 1H), 7.35 (s, 2H), 8.20 (m, 1H), 8.35 (s, 1H).

(1S, 3R)-1-(9-Adenenyl)-3-methylcarboxycyclopentane (29b).

^{1}H NMR (400 MHz, DMSO): δ 2.20 (m, 3H), 2.30 (m, 1H), 2.40 (m, 1H), 2.55 (m, 1H), 3.15 (m, 1H), 3.80 (s, 3H), 5.00 (m, 1H), 7.35 (s, 2H), 8.20 (m, 1H), 8.35 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)cyclopentane (30a).

^{1}H NMR (400 MHz, DMSO): δ 2.00 (m, 2H), 2.30 (m, 3H), 2.50 (m, 1H), 2.80 (m, 1H), 5.00 (m, 1H), 7.35 (s, 2H), 8.25 (m, 1H), 8.45 (s, 1H), 8.95 (s, 1H), 10.65 (s, 1H).
HRMS: calcd ($C_{11}H_{14}N_6O_2$) *m/z* 263.1257 ($M^+ + 1$), found 263.1254 ($M^+ + 1$).

(1S, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)cyclopentane (30b).

^{1}H NMR (400 MHz, DMSO): δ 2.00 (m, 2H), 2.30 (m, 3H), 2.50 (m, 1H), 2.80 (m, 1H), 5.00 (m, 1H), 7.35 (s, 2H), 8.25 (m, 1H), 8.45 (s, 1H), 8.95 (s, 1H), 10.65 (s, 1H).
HRMS: calcd ($C_{11}H_{14}N_6O_2$) *m/z* 263.1257 ($M^+ + 1$), found 263.1257 ($M^+ + 1$).

(1S, 3R)-1-(9-Adenenyl)-3-methylcarboxy-4-cyclopentene (28a).

^{1}H NMR (400 MHz, DMSO): δ 2.25 (m, 1H), 2.95 (m, 1H), 3.75 (s, 3H), 3.90 (m, 1H), 5.75 (m, 1H), 6.20 (m, 1H), 6.30 (m, 1H), 7.35 (s, 2H), 8.05 (s, 1H), 8.25 (s, 1H).

(1R, 3S)-1-(9-Adenenyl)-3-methylcarboxy-4-cyclopentene (28b).

^{1}H NMR (400 MHz, DMSO): δ 2.25 (m, 1H), 2.95 (m, 1H), 3.75 (s, 3H), 3.90 (m, 1H), 5.75 (m, 1H), 6.20 (m, 1H), 6.30 (m, 1H), 7.35 (s, 2H), 8.05 (s, 1H), 8.25 (s, 1H).

(1S, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)-4-cyclopentene (31a) and (1S, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)-4-cyclopentene (32a).

Compound **31a**: ^{1}H NMR (400 MHz, DMSO): δ 2.10 (m, 1H), 2.90 (m, 1H), 3.55 (m, 1H), 5.80 (m, 1H), 6.15 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H), 9.05 (bs, 1H), 10.80 (bs, 1H). HRMS: calcd ($C_{11}H_{12}N_6O_2$) *m/z* 261.1100 ($M^+ + 1$), found 261.1101 ($M^+ + 1$). Compound **32a**: ^{1}H NMR (400 MHz, DMSO): δ 2.30 (m, 1H), 2.75 (m, 1H), 3.85 (m, 1H), 5.85 (m, 1H), 6.15 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H), 9.00 (s, 1H), 10.80 (s, 1H). HRMS: calcd ($C_{11}H_{12}N_6O_2$) *m/z* 261.1100 ($M^+ + 1$), found 261.1103 ($M^+ + 1$).

(1R, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)-4-cyclopentene (31b) and (1R, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)-4-cyclopentene (32b).

Compound **31b**: ^{1}H NMR (400 MHz, DMSO): δ 2.10 (m, 1H), 2.90 (m, 1H), 3.55 (m, 1H), 5.80 (m, 1H), 6.15 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.25 (s, 1H), 8.35 (s, 1H), 9.05 (bs, 1H), 10.80 (bs, 1H). HRMS: calcd ($C_{11}H_{12}N_6O_2$) *m/z* 261.1100 ($M^+ + 1$), found 261.1101 ($M^+ + 1$). Compound **32b**: ^{1}H NMR (400 MHz, DMSO): δ 2.30 (m, 1H), 2.75 (m, 1H), 3.85 (m, 1H), 5.85 (m, 1H), 6.15 (m, 1H), 6.20 (m, 1H), 7.35 (s, 2H), 8.15 (s, 1H), 8.25 (s, 1H), 9.00 (bs, 1H), 10.80 (bs, 1H). HRMS: calcd ($C_{11}H_{12}N_6O_2$) *m/z* 261.1100 ($M^+ + 1$), found 261.1096 ($M^+ + 1$).

(1R, 3R)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)cyclopentane (33a).

^{1}H NMR (400 MHz, DMSO): δ 1.90 (m, 1H), 2.15-2.40 (m, 5H), 2.95 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.30 (s, 1H), 8.90 (s, 1H), 10.60 (s, 1H). HRMS: calcd ($C_{11}H_{14}N_6O_2$) *m/z* 263.1257 ($M^+ + 1$), found 263.1260 ($M^+ + 1$).

(1S, 3S)-1-(9-Adenenyl)-3-(N-hydroxycarbamoyl)cyclopentane (33b).

^{1}H NMR (400 MHz, DMSO): δ 1.90 (m, 1H), 2.15-2.40 (m, 5H), 2.95 (m, 1H), 5.05 (m, 1H), 7.30 (s, 2H), 8.25 (s, 1H), 8.30 (s, 1H), 8.90 (s, 1H), 10.60 (s, 1H). HRMS: calcd ($C_{11}H_{14}N_6O_2$) *m/z* 263.1257 ($M^+ + 1$), found 263.1252 ($M^+ + 1$).