Design, Synthesis and Biological Evaluation of N^4-Sulfonamido-Succinamic, Phthalamic, Acrylic and Benzoyl Acetic Acid Derivatives as Potential DPP IV Inhibitors

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### Supplementary Material

#### Table 2. Docking Scoring Functions for the Synthesized Compounds 6-21 Inside the DPP IV Binding Pocket

| Docking Pose | Ligscore 1 | Ligscore 2 | PLP1 | PLP2 | Jain | PMF | Dock score |
|--------------|-----------|-----------|------|------|------|-----|------------|
| 6            | 5.84      | 5.95      | 90.46| 77.3 | 1.73 | 105.01 | 96.165     |
| 6            | 5.84      | 5.98      | 89.07| 83.86| 3.57 | 105.38 | 92.092     |
| 6            | 4.92      | 4.77      | 45.69| 35.71| 0.19 | 35.32  | 91.711     |
| 6            | 4.31      | 4.39      | 34.32| 31.91| 0.85 | 30.5   | 90.703     |
| 6            | 5.01      | 5.23      | 45.49| 33.74| -0.5 | 57.15  | 89.026     |
| 6            | 5.69      | 5.63      | 89.4 | 80.62| 3.36 | 101.25 | 88.547     |
| 6            | 6.53      | 6.15      | 73.32| 66.11| 0.71 | 95.39  | 87.364     |
| 6            | 5.53      | 5.72      | 78.43| 64.33| 0.36 | 98.67  | 86.671     |
| 6            | 5.81      | 5.45      | 56.5 | 54.82| -0.49| 82.02  | 84.357     |
| 6            | 5.27      | 5.46      | 44.9 | 43.59| 0.01 | 80.03  | 84.234     |
| 7            | 4.64      | 5.23      | 46.01| 36.56| -0.55| 48.87  | 91.305     |
| 7            | 4.65      | 5.24      | 45.99| 36.56| -0.55| 48.54  | 90.828     |
| 7            | 4.84      | 4.61      | 38.89| 31.6 | -0.36| 21.18  | 89.625     |
| 7            | 6.37      | 6.41      | 69.27| 54.37| 0.56 | 91.09  | 88.898     |
| 7            | 5.36      | 4.66      | 32.97| 30.57| 0.14 | 43.51  | 88.273     |
| 7            | 4.5       | 4.5       | 35.55| 24.77| -0.11| 19.71  | 87.963     |
| 7            | 5.36      | 4.66      | 32.97| 30.57| 0.14 | 43.59  | 87.556     |
| 7            | 4.64      | 4.44      | 31.45| 21.22| 0    | 34.49  | 85.49      |
| 7            | 4.41      | 4.63      | 38.12| 26.8 | -0.19| 29.4   | 84.961     |
| 7            | 4.41      | 4.45      | 34.53| 24.78| -0.13| 22.87  | 84.842     |
| 8            | 5.57      | 5.21      | 54.39| 52.43| -0.23| 78.33  | 97.76      |
| 8            | 5.89      | 5.49      | 52.6 | 55.84| 1.64 | 77.03  | 93.967     |
| 8            | 5.62      | 5.45      | 62.51| 63.69| 1.07 | 101.12 | 92.271     |
| 8            | 5.9       | 5.49      | 52.6 | 55.84| 1.64 | 77.32  | 90.088     |
(Table 2) contd....

| Docking Pose | Ligscore 1 | Ligscore 2 | PLP1 | PLP2 | Jain | PMF | Dock score |
|--------------|------------|------------|------|------|------|-----|------------|
| 8            | 4.54       | 4.43       | 41.98| 38.73| -0.48| 55.33| 89.176     |
| 8            | 5.95       | 5.75       | 63.99| 56.46| 2.51 | 91.58| 87.839     |
| 8            | 5.53       | 5.15       | 42.4 | 40.3 | 1.03 | 64.46| 86.881     |
| 8            | 5.6        | 5.39       | 49.15| 47.47| 1.02 | 54.1 | 86.806     |
| 8            | 5.53       | 5.15       | 42.4 | 40.29| 1.03 | 64.46| 86.217     |
| 8            | 5.19       | 4.81       | 35.19| 40.33| 0.57 | 57.47| 86.092     |
| 9            | 5.8        | 5.59       | 68.2 | 72.09| 3.77 | 116.16| 93.835     |
| 9            | 5.33       | 5.24       | 72.2 | 70.03| 2.27 | 99.97| 88.018     |
| 9            | 6.48       | 6.46       | 67.14| 70.45| 2.88 | 83.5 | 83.584     |
| 9            | 5.29       | 5.08       | 74.1 | 71.23| 3.14 | 105.95| 82.887     |
| 9            | 5.7        | 5.64       | 77.45| 73.69| 3.36 | 96.76| 82.315     |
| 9            | 4.86       | 4.89       | 67.44| 67   | 3.78 | 94.46| 81.918     |
| 9            | 5.95       | 5.64       | 71.22| 66.85| 2.26 | 95.96| 81.596     |
| 9            | 6.38       | 6.26       | 72.15| 70.96| 2.78 | 103.29| 80.633     |
| 9            | 5.41       | 5.47       | 75.25| 73.01| 2.09 | 99.6 | 80.604     |
| 9            | 6.17       | 5.6        | 74.21| 67.02| 2.44 | 90.58| 80.503     |
| 10           | 6.02       | 5.31       | 68.41| 65.51| 1.29 | 77.87| 87.256     |
| 10           | 6.02       | 5.49       | 61.76| 58.58| 0.75 | 70.04| 86.903     |
| 10           | 5.83       | 5.81       | 46.1 | 38.43| 1.58 | 77.61| 86.239     |
| 10           | 5.19       | 4.65       | 41.39| 43.5 | -0.34| 53.88| 85.408     |
| 10           | 5.69       | 5.14       | 58.31| 53.92| 0.64 | 73.64| 85.074     |
| 10           | 5.67       | 5.15       | 54.5 | 51.18| 0.33 | 69.39| 84.842     |
| 10           | 5.56       | 5.16       | 54.91| 52.01| 0.47 | 59.18| 84.682     |
| 10           | 5.72       | 5.02       | 50.37| 50.13| 0.98 | 52.71| 84.299     |
| 10           | 5.71       | 5.18       | 54.68| 51.92| 0.1  | 76.02| 83.276     |
| 10           | 5.06       | 5.03       | 48.75| 52.24| 1.41 | 68.26| 83.151     |
| 11           | 5.99       | 5.94       | 44.67| 44.1 | 2.46 | 67.26| 97.483     |
| 11           | 5.5        | 5          | 46.02| 44.86| 1.06 | 63.56| 92.506     |
| 11           | 5.7        | 5.6        | 44.85| 46.26| 1.32 | 71.52| 91.423     |
| 11           | 5.87       | 5.66       | 55.02| 47.25| 0.11 | 66.97| 90.924     |
| 11           | 5.96       | 5.51       | 43.89| 51.19| 1.58 | 61.99| 90.738     |
| 11           | 6.21       | 5.68       | 50.92| 45.77| 2.14 | 66.46| 90.216     |
| 11           | 5.27       | 4.9        | 45.64| 40.46| -0.08| 33.28| 89.877     |
| 11           | 4.7        | 4.46       | 41.17| 36.11| -0.17| 40.09| 88.974     |
| 11           | 5.87       | 5.67       | 54.82| 47.02| 0.12 | 67.09| 88.391     |
| 11           | 5.86       | 5.18       | 47.72| 41.73| -0.36| 68.04| 88.266     |
| 12           | 5.08       | 4.95       | 44.8 | 35.5 | 0.05 | 39.39| 99.523     |
| Docking Pose | Ligscore 1 | Ligscore 2 | PLP1  | PLP2  | Jain  | PMF   | Dock score |
|--------------|-----------|-----------|-------|-------|-------|-------|------------|
| 12           | 6.09      | 5.66      | 45.44 | 44.45 | 1.98  | 61.31 | 98.211     |
| 12           | 4.94      | 4.88      | 47.79 | 39.02 | -0.09 | 53.6  | 96.334     |
| 12           | 5.93      | 6.11      | 89.43 | 82.83 | 3.64  | 111.75| 95.496     |
| 12           | 5.21      | 5.03      | 61.05 | 50.98 | 0.39  | 46.43 | 93.352     |
| 12           | 5.65      | 5.83      | 72.88 | 65.51 | 3.09  | 104.47| 93.117     |
| 12           | 5.61      | 5.3       | 67.46 | 55.72 | -0.14 | 102.07| 92.36      |
| 12           | 5.63      | 5.32      | 68.77 | 56.15 | 0     | 100.5 | 91.571     |
| 12           | 5.66      | 5.55      | 70.61 | 53.68 | 0.16  | 105.01| 91.274     |
| 12           | 5.93      | 6.11      | 89.43 | 82.83 | 3.64  | 111.74| 90.807     |
| 13           | 5.28      | 4.95      | 45.34 | 46.9  | 2.05  | 68.29 | 90.52      |
| 13           | 5.5       | 6.13      | 59.88 | 60.33 | 2.38  | 75.58 | 89.048     |
| 13           | 6.02      | 6.01      | 63.85 | 62.39 | 1.25  | 115.11| 88.912     |
| 13           | 4.55      | 4.31      | 35.13 | 32.25 | -1    | 43.37 | 88.585     |
| 13           | 6.02      | 6.04      | 64.01 | 62.5  | 1.17  | 115.7 | 87.97      |
| 13           | 5.39      | 5.15      | 49.45 | 52.31 | 2.01  | 79.89 | 87.925     |
| 13           | 6.1       | 5.95      | 68.93 | 72.56 | 1.65  | 119.63| 87.374     |
| 13           | 6.21      | 5.93      | 70.74 | 71.53 | 2.21  | 98.88 | 87.034     |
| 13           | 5.71      | 5.88      | 64.17 | 64.81 | 1.63  | 109.12| 86.581     |
| 13           | 5.77      | 5.4       | 53.53 | 56.61 | 3.08  | 81.57 | 86.412     |
| 14           | 5.43      | 4.93      | 52.94 | 53.51 | 2     | 71.01 | 99.06      |
| 14           | 5.34      | 4.83      | 56.01 | 60.37 | 0.64  | 94.65 | 98.275     |
| 14           | 5.34      | 4.82      | 56.04 | 60.39 | 0.64  | 94.34 | 95.901     |
| 14           | 5.21      | 5.15      | 56.58 | 58.25 | 0     | 92.59 | 93.389     |
| 14           | 5         | 4.92      | 38.43 | 35.69 | 1.78  | 60.5  | 93.185     |
| 14           | 5.42      | 4.93      | 52.76 | 53.41 | 2.07  | 72.12 | 92.565     |
| 14           | 5.69      | 4.94      | 46.4  | 49.07 | 2.53  | 47.28 | 92.264     |
| 14           | 5.41      | 4.91      | 52.54 | 53.25 | 2.04  | 73.68 | 91.599     |
| 14           | 5.46      | 4.9       | 44.22 | 46.23 | -0.73 | 82.88 | 91.569     |
| 14           | 5.71      | 5.55      | 38.11 | 34.73 | 0.02  | 52.2  | 91.097     |
| 15           | 6.29      | 5.88      | 70.44 | 66.84 | 4.29  | 97.09 | 89.674     |
| 15           | 5.96      | 5.86      | 57.68 | 43.82 | -0.83 | 65.12 | 86.862     |
| 15           | 5.67      | 5.47      | 71.72 | 65.16 | 2.13  | 86.77 | 86.402     |
| 15           | 5.67      | 5.47      | 71.72 | 65.16 | 2.13  | 86.76 | 86.398     |
| 15           | 5.57      | 5.38      | 65.65 | 59.77 | 2.11  | 78.21 | 86.116     |
| 15           | 5.55      | 5.3       | 54.29 | 51.46 | 0.69  | 80.95 | 85.273     |
| 15           | 5.24      | 5.16      | 50.87 | 50.69 | 0.83  | 79.66 | 84.784     |
| 15           | 5.77      | 5.26      | 54.41 | 44.66 | 0.17  | 93.82 | 84.49      |
(Table 2) contd....

| Docking Pose | Ligscore 1 | Ligscore 2 | PLP1  | PLP2  | Jain  | PMF   | Dock score |
|--------------|------------|------------|-------|-------|-------|-------|------------|
| 15           | 5.4        | 4.94       | 46.15 | 43.5  | 0.93  | 63.9  | 84.359     |
| 15           | 5.54       | 5.44       | 73.05 | 70.14 | 2.3   | 103.19| 83.934     |
| 16           | 5.27       | 5.23       | 45.25 | 43.21 | 1.68  | 64.79 | 95.841     |
| 16           | 5.74       | 5.48       | 58.16 | 53.25 | 1.18  | 58.48 | 95.714     |
| 16           | 5.77       | 5.2        | 46.33 | 39.02 | 1.93  | 52.62 | 95.291     |
| 16           | 5.42       | 5.21       | 70.57 | 64.85 | 1.29  | 71.38 | 94.027     |
| 16           | 5.44       | 5.46       | 64.41 | 53.67 | -0.12 | 105.45| 89.172     |
| 16           | 5.99       | 5.92       | 57.62 | 47.75 | 3.33  | 72.74 | 88.435     |
| 16           | 6.01       | 5.82       | 50.74 | 56.89 | 2.01  | 95.69 | 88.105     |
| 16           | 5.95       | 5.6        | 55.32 | 51.37 | 1.46  | 85.07 | 87.023     |
| 16           | 5.99       | 5.92       | 57.62 | 47.75 | 3.33  | 72.74 | 86.466     |
| 16           | 5.97       | 5.53       | 58.3  | 53.56 | 1.35  | 86.84 | 85.186     |
| 17           | 5.5        | 5.27       | 56.05 | 60.31 | 2.35  | 83.94 | 106.087    |
| 17           | 5.56       | 5.37       | 53.74 | 47.84 | -0.6  | 75.96 | 99.158     |
| 17           | 5.96       | 5.47       | 59.89 | 62.92 | 1.29  | 86.27 | 98.741     |
| 17           | 6.09       | 5.82       | 58.93 | 56.92 | 1.95  | 92.61 | 97.304     |
| 17           | 5.85       | 6.03       | 88.22 | 75.01 | 1.35  | 113.22| 97.046     |
| 17           | 5.92       | 5.57       | 61.17 | 62.12 | 2.79  | 72.26 | 96.505     |
| 17           | 5.77       | 5.58       | 73.44 | 60.72 | 0.13  | 105.43| 96.078     |
| 17           | 5.77       | 5.58       | 73.42 | 60.7  | 0.13  | 105.25| 95.179     |
| 17           | 5.49       | 5.31       | 62.01 | 52.78 | 1.22  | 56.94 | 94.073     |
| 17           | 5.89       | 5.72       | 70.45 | 67.26 | 0.49  | 104.58| 93.283     |
| 18           | 6.79       | 6.43       | 75.94 | 73.34 | 2.26  | 87.24 | 93.175     |
| 18           | 6.27       | 6.12       | 62.31 | 56.76 | 1.97  | 106.05| 91.459     |
| 18           | 6.58       | 6.42       | 75.65 | 84.92 | 3.92  | 83.27 | 89.783     |
| 18           | 6.58       | 6.43       | 75.65 | 84.93 | 3.92  | 83.45 | 88.519     |
| 18           | 5.87       | 4.9        | 56.62 | 54.91 | 0.44  | 67.39 | 86.336     |
| 18           | 5.67       | 5.57       | 71.28 | 70.12 | 0.98  | 109.37| 85.931     |
| 18           | 6.5        | 6.38       | 94.66 | 76.79 | 3.74  | 103.37| 84.618     |
| 18           | 6.61       | 6.36       | 73.62 | 70.61 | 3.34  | 83.94 | 84.456     |
| 18           | 5.71       | 6.3        | 62.09 | 55.22 | 0.81  | 93.59 | 84.395     |
| 18           | 5.06       | 4.68       | 48.32 | 38.16 | -0.07 | 27.2  | 83.593     |
| 19           | 6.26       | 6.01       | 63.99 | 63.38 | 2.68  | 91.97 | 101.664    |
| 19           | 6.02       | 5.49       | 52.35 | 54.95 | 2.18  | 86.84 | 97.882     |
| 19           | 5.37       | 5.27       | 53.65 | 52.22 | 0.65  | 84.83 | 94.197     |
| 19           | 5.38       | 5.27       | 53.37 | 51.88 | 0.75  | 81.43 | 93.958     |
| 19           | 5.48       | 5.25       | 63.9  | 58.15 | 2     | 88.53 | 92.626     |
| Docking Pose | Ligscore 1 | Ligscore 2 | PLP1 | PLP2 | Jain | PMF  | Dock score |
|--------------|------------|------------|------|------|------|------|-------------|
| 19           | 5.99       | 5.69       | 54.91| 57.53| 3.2  | 95.69 | 90.825      |
| 19           | 5.37       | 5.18       | 49.92| 42.63| -0.76| 73.21 | 90.313      |
| 19           | 5.47       | 5.22       | 39.82| 46.78| 3.05 | 63.4  | 90.297      |
| 19           | 5.42       | 5.38       | 60.97| 62.44| 0.72 | 102.83| 90.092      |
| 19           | 5.51       | 5.35       | 60.85| 64.68| 1.53 | 102.84| 89.374      |
| 20           | 5.68       | 5.89       | 56.34| 55.83| 0.44 | 82.31 | 90.238      |
| 20           | 5.9        | 6.02       | 52.17| 60.94| 2.83 | 73.58 | 90.153      |
| 20           | 4.92       | 5          | 46.8 | 37.3 | -1.09| 42.06 | 88.693      |
| 20           | 4.94       | 5.37       | 60.11| 53.63| 0.62 | 102.86| 86.841      |
| 20           | 6.04       | 6.01       | 63.19| 73.86| 2.77 | 87.82 | 86.278      |
| 20           | 5.96       | 5.39       | 59.49| 52.98| 1.39 | 81.47 | 86.269      |
| 20           | 6.06       | 6.34       | 68.65| 59.73| 2.47 | 86.29 | 84.716      |
| 20           | 5.79       | 5.61       | 59.64| 63.59| 1.34 | 73.13 | 84.178      |
| 20           | 5          | 5.36       | 47.94| 46.07| -0.63| 46.32 | 83.276      |
| 20           | 5.58       | 5.19       | 50.98| 38.15| 0.13 | 60.94 | 83.036      |
| 21           | 5.59       | 5.32       | 50.28| 55.31| 2.54 | 79.81 | 103.344     |
| 21           | 6.03       | 5.89       | 49.13| 45.5 | 0.9  | 62.77 | 97.012      |
| 21           | 5.43       | 5.28       | 40.08| 40.23| 1.49 | 65.25 | 89.284      |
| 21           | 5.23       | 4.85       | 55.73| 44.43| 0.4  | 95.16 | 88.451      |
| 21           | 5.48       | 5.08       | 58.5 | 56.6 | 1.17 | 90.27 | 87.765      |
| 21           | 5.72       | 5.43       | 63.36| 53   | 1.15 | 100.75| 86.864      |
| 21           | 5.99       | 5.98       | 68.15| 63.33| 1.58 | 69.58 | 86.634      |
| 21           | 5.65       | 6.02       | 70.14| 58.15| 0.66 | 71.86 | 86.583      |
| 21           | 5.55       | 5.05       | 41.5 | 32.47| 0.45 | 34.41 | 85.654      |
| 21           | 5.91       | 5.59       | 54.45| 47.67| 2.35 | 63.74 | 85.479      |