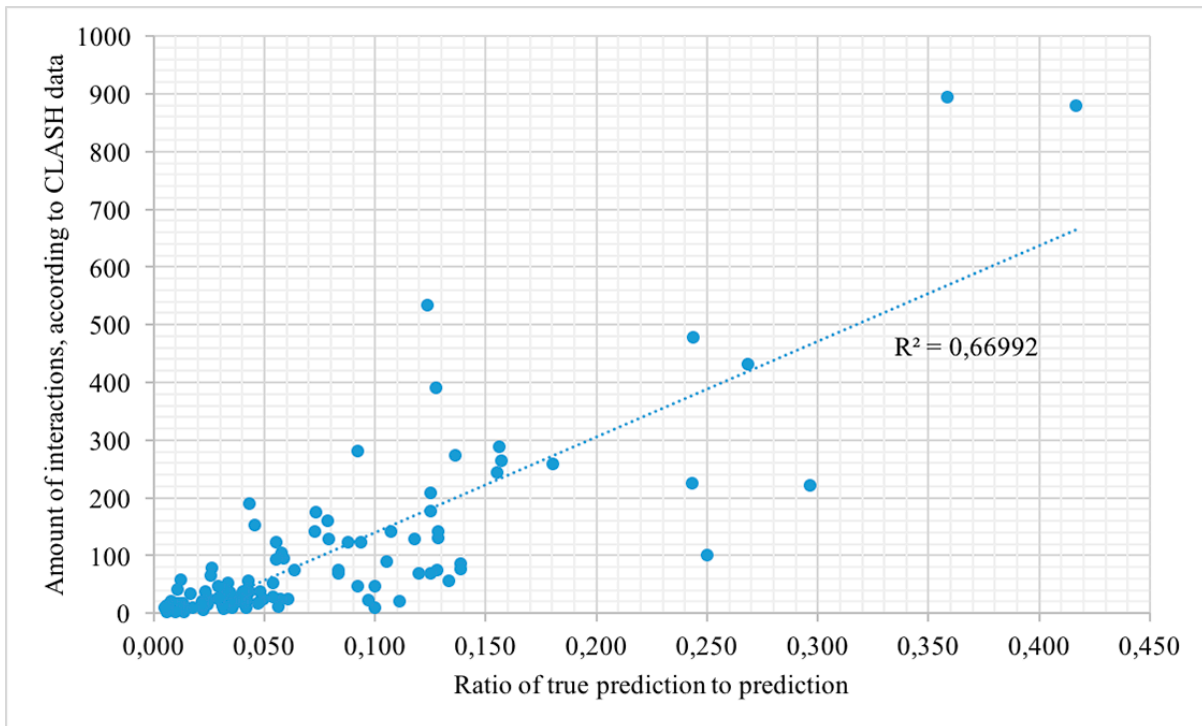


## Supplementary material

**Supplementary Figure S1. The correlation between the number of interactions (CLASH data) and between the ratios of true predictions to all predictions for each of the 102 miRNAs.** All five miRNA prediction programmes made 624 correctly predicted miRNA-mRNA interactions, which were formed by 102 miRNAs. For these 102 miRNAs, we defined the ratio of correctly predicted to all predicted pairs and marked it on the X-axis. On the Y-axis we marked the number of miRNA-mRNA interactions formed by the miRNA according to CLASH data.



**Supplementary Table S1. Characteristics of the 102 miRNAs that formed correctly predicted miRNA-mRNA interactions.** The number of their interactions with mRNAs according to CLASH data, predictions, true predictions and their prediction quality indexes.

| miRNA_name  | Number_of_interactions_CLASH_data | Number_of_predictions | Number_of_true_predictions | ratio=true_predictions/predictions | Not_predicted_interactions | true_predictions/not_predicted_interactions | ratio=(true_predictions/predictions)/not_predicted_interactions | ratio=H/smallest_ratio |
|-------------|-----------------------------------|-----------------------|----------------------------|------------------------------------|----------------------------|---|---|------------------------|
| miR-363-3p  | 2                                 | 72                    | 1                          | 1%                                 | 1                          | 100%  | 0,0139  | 63,13                  |
| miR-340-3p  | 9                                 | 10                    | 1                          | 10%                                | 8                          | 13%   | 0,0125  | 56,82                  |
| miR-130a-3p | 2                                 | 104                   | 1                          | 1%                                 | 1                          | 100%  | 0,0096  | 43,71                  |
| miR-29c-3p  | 11                                | 89                    | 5                          | 6%                                 | 6                          | 83%   | 0,0094  | 42,56                  |
| miR-130b-3p | 7                                 | 95                    | 3                          | 3%                                 | 4                          | 75%   | 0,0079  | 35,89                  |
| miR-132-3p  | 9                                 | 48                    | 2                          | 4%                                 | 7                          | 29%   | 0,0060  | 27,06                  |
| miR-330-3p  | 20                                | 9                     | 1                          | 11%                                | 19                         | 5%  | 0,0058  | 26,58                  |
| miR-28-5p   | 23                                | 31                    | 3                          | 10%                                | 20                         | 15%   | 0,0048  | 21,99                  |
| miR-210-3p  | 9                                 | 28                    | 1                          | 4%                                 | 8                          | 13%   | 0,0045  | 20,29                  |
| miR-200c-3p | 6                                 | 45                    | 1                          | 2%                                 | 5                          | 20%   | 0,0044  | 20,20                  |
| miR-301a-3p | 18                                | 85                    | 4                          | 5%                                 | 14                         | 29%   | 0,0034  | 15,28                  |
| miR-424-5p  | 25                                | 181                   | 9                          | 5%                                 | 16                         | 56%   | 0,0031  | 14,13                  |
| miR-218-5p  | 19                                | 63                    | 3                          | 5%                                 | 16                         | 19%   | 0,0030  | 13,53                  |
| miR-20b-5p  | 3                                 | 171                   | 1                          | 1%                                 | 2                          | 50%   | 0,0029  | 13,29                  |
| miR-29a-3p  | 24                                | 70                    | 4                          | 6%                                 | 20                         | 20%   | 0,0029  | 12,99                  |
| miR-18b-5p  | 13                                | 64                    | 2                          | 3%                                 | 11                         | 18%   | 0,0028  | 12,91                  |
| miR-365a-3p | 24                                | 33                    | 2                          | 6%                                 | 22                         | 9%  | 0,0028  | 12,52                  |
| miR-708-5p  | 13                                | 32                    | 1                          | 3%                                 | 12                         | 8%  | 0,0026  | 11,84                  |
| miR-361-5p  | 56                                | 30                    | 4                          | 13%                                | 52                         | 8%  | 0,0026  | 11,66                  |
| miR-99a-5p  | 101                               | 4                     | 1                          | 25%                                | 100                        | 1%  | 0,0025  | 11,36                  |
| miR-22-3p   | 19                                | 50                    | 2                          | 4%                                 | 17                         | 12%   | 0,0024  | 10,70                  |
| miR-454-3p  | 28                                | 93                    | 5                          | 5%                                 | 23                         | 22%   | 0,0023  | 10,63                  |
| miR-31-5p   | 46                                | 65                    | 6                          | 9%                                 | 40                         | 15%   | 0,0023  | 10,49                  |
| let-7g-5p   | 15                                | 164                   | 4                          | 2%                                 | 11                         | 36%   | 0,0022  | 10,08                  |
| miR-138-5p  | 9                                 | 57                    | 1                          | 2%                                 | 8                          | 13%   | 0,0022  | 9,97                   |
| miR-17-3p   | 47                                | 10                    | 1                          | 10%                                | 46                         | 2%  | 0,0022  | 9,88                   |
| miR-148b-3p | 23                                | 71                    | 3                          | 4%                                 | 20                         | 15%   | 0,0021  | 9,60                   |
| miR-185-5p  | 69                                | 92                    | 11                         | 12%                                | 58                         | 19%   | 0,0021  | 9,37                   |
| miR-19a-3p  | 7                                 | 83                    | 1                          | 1%                                 | 6                          | 17%   | 0,0020  | 9,13                   |
| miR-96-5p   | 21                                | 83                    | 3                          | 4%                                 | 18                         | 17%   | 0,0020  | 9,13                   |
| miR-339-5p  | 70                                | 56                    | 7                          | 13%                                | 63                         | 11%   | 0,0020  | 9,02                   |
| miR-19b-3p  | 13                                | 92                    | 2                          | 2%                                 | 11                         | 18%   | 0,0020  | 8,98                   |
| miR-505-3p  | 76                                | 36                    | 5                          | 14%                                | 71                         | 7%  | 0,0020  | 8,89                   |

|             |     |     |    |     |     |     |        |      |
|-------------|-----|-----|----|-----|-----|-----|--------|------|
| miR-342-3p  | 74  | 39  | 5  | 13% | 69  | 7%  | 0,0019 | 8,45 |
| miR-29b-3p  | 25  | 104 | 4  | 4%  | 21  | 19% | 0,0018 | 8,33 |
| miR-18a-5p  | 86  | 72  | 10 | 14% | 76  | 13% | 0,0018 | 8,31 |
| miR-27a-3p  | 23  | 116 | 4  | 3%  | 19  | 21% | 0,0018 | 8,25 |
| miR-15a-5p  | 38  | 188 | 9  | 5%  | 29  | 31% | 0,0017 | 7,50 |
| let-7i-5p   | 9   | 185 | 2  | 1%  | 7   | 29% | 0,0015 | 7,02 |
| miR-193a-3p | 15  | 47  | 1  | 2%  | 14  | 7%  | 0,0015 | 6,91 |
| miR-27b-3p  | 69  | 120 | 10 | 8%  | 59  | 17% | 0,0014 | 6,42 |
| miR-324-5p  | 222 | 27  | 8  | 30% | 214 | 4%  | 0,0014 | 6,29 |
| miR-182-5p  | 38  | 69  | 3  | 4%  | 35  | 9%  | 0,0012 | 5,65 |
| miR-346     | 25  | 34  | 1  | 3%  | 24  | 4%  | 0,0012 | 5,57 |
| miR-128-3p  | 37  | 99  | 4  | 4%  | 33  | 12% | 0,0012 | 5,57 |
| miR-378a-3p | 90  | 38  | 4  | 11% | 86  | 5%  | 0,0012 | 5,56 |
| let-7f-5p   | 53  | 148 | 8  | 5%  | 45  | 18% | 0,0012 | 5,46 |
| miR-330-5p  | 26  | 34  | 1  | 3%  | 25  | 4%  | 0,0012 | 5,35 |
| miR-125a-5p | 75  | 48  | 4  | 8%  | 71  | 6%  | 0,0012 | 5,34 |
| miR-10a-5p  | 226 | 37  | 9  | 24% | 217 | 4%  | 0,0011 | 5,10 |
| miR-196b-5p | 41  | 71  | 3  | 4%  | 38  | 8%  | 0,0011 | 5,05 |
| miR-15b-5p  | 141 | 187 | 24 | 13% | 117 | 21% | 0,0011 | 4,99 |
| miR-7-5p    | 21  | 46  | 1  | 2%  | 20  | 5%  | 0,0011 | 4,94 |
| miR-107     | 26  | 122 | 3  | 2%  | 23  | 13% | 0,0011 | 4,86 |
| miR-26a-5p  | 130 | 70  | 9  | 13% | 121 | 7%  | 0,0011 | 4,83 |
| miR-30e-5p  | 35  | 58  | 2  | 3%  | 33  | 6%  | 0,0010 | 4,75 |
| miR-221-3p  | 128 | 68  | 8  | 12% | 120 | 7%  | 0,0010 | 4,46 |
| miR-181b-5p | 74  | 110 | 7  | 6%  | 67  | 10% | 0,0009 | 4,32 |
| miR-106a-5p | 40  | 158 | 5  | 3%  | 35  | 14% | 0,0009 | 4,11 |
| miR-20a-5p  | 141 | 177 | 19 | 11% | 122 | 16% | 0,0009 | 4,00 |
| miR-34a-5p  | 56  | 117 | 5  | 4%  | 51  | 10% | 0,0008 | 3,81 |
| miR-183-5p  | 124 | 64  | 6  | 9%  | 118 | 5%  | 0,0008 | 3,61 |
| let-7d-5p   | 18  | 159 | 2  | 1%  | 16  | 13% | 0,0008 | 3,57 |
| miR-17-5p   | 259 | 161 | 29 | 18% | 230 | 13% | 0,0008 | 3,56 |
| miR-148a-3p | 18  | 77  | 1  | 1%  | 17  | 6%  | 0,0008 | 3,47 |
| miR-23b-3p  | 124 | 91  | 8  | 9%  | 116 | 7%  | 0,0008 | 3,44 |
| miR-30c-5p  | 177 | 64  | 8  | 13% | 169 | 5%  | 0,0007 | 3,36 |
| miR-204-5p  | 17  | 88  | 1  | 1%  | 16  | 6%  | 0,0007 | 3,23 |
| miR-24-3p   | 17  | 92  | 1  | 1%  | 16  | 6%  | 0,0007 | 3,09 |
| miR-222-3p  | 244 | 71  | 11 | 15% | 233 | 5%  | 0,0007 | 3,02 |
| miR-181a-5p | 37  | 86  | 2  | 2%  | 35  | 6%  | 0,0007 | 3,02 |
| miR-16-5p   | 265 | 172 | 27 | 16% | 238 | 11% | 0,0007 | 3,00 |
| miR-30b-5p  | 53  | 60  | 2  | 3%  | 51  | 4%  | 0,0007 | 2,97 |
| miR-30d-5p  | 47  | 69  | 2  | 3%  | 45  | 4%  | 0,0006 | 2,93 |
| miR-196a-5p | 129 | 76  | 6  | 8%  | 123 | 5%  | 0,0006 | 2,92 |

|             |     |     |    |     |     |     |        |      |
|-------------|-----|-----|----|-----|-----|-----|--------|------|
| miR-193b-3p | 432 | 41  | 11 | 27% | 421 | 3%  | 0,0006 | 2,90 |
| miR-497-5p  | 9   | 197 | 1  | 1%  | 8   | 13% | 0,0006 | 2,88 |
| miR-125b-5p | 209 | 88  | 11 | 13% | 198 | 6%  | 0,0006 | 2,87 |
| miR-10b-5p  | 96  | 34  | 2  | 6%  | 94  | 2%  | 0,0006 | 2,84 |
| miR-197-3p  | 93  | 36  | 2  | 6%  | 91  | 2%  | 0,0006 | 2,78 |
| let-7a-5p   | 289 | 160 | 25 | 16% | 264 | 9%  | 0,0006 | 2,69 |
| miR-421     | 104 | 52  | 3  | 6%  | 101 | 3%  | 0,0006 | 2,60 |
| let-7e-5p   | 274 | 176 | 24 | 14% | 250 | 10% | 0,0005 | 2,48 |
| miR-320a    | 478 | 123 | 30 | 24% | 448 | 7%  | 0,0005 | 2,47 |
| miR-25-3p   | 142 | 96  | 7  | 7%  | 135 | 5%  | 0,0005 | 2,46 |
| miR-93-5p   | 160 | 165 | 13 | 8%  | 147 | 9%  | 0,0005 | 2,44 |
| miR-30a-5p  | 33  | 61  | 1  | 2%  | 32  | 3%  | 0,0005 | 2,33 |
| miR-195-5p  | 13  | 170 | 1  | 1%  | 12  | 8%  | 0,0005 | 2,23 |
| miR-106b-5p | 123 | 181 | 10 | 6%  | 113 | 9%  | 0,0005 | 2,22 |
| miR-615-3p  | 879 | 12  | 5  | 42% | 874 | 1%  | 0,0005 | 2,17 |
| miR-296-3p  | 176 | 41  | 3  | 7%  | 173 | 2%  | 0,0004 | 1,92 |
| miR-92a-3p  | 895 | 92  | 33 | 36% | 862 | 4%  | 0,0004 | 1,89 |
| miR-320c    | 20  | 128 | 1  | 1%  | 19  | 5%  | 0,0004 | 1,87 |
| miR-320b    | 66  | 116 | 3  | 3%  | 63  | 5%  | 0,0004 | 1,87 |
| miR-328-3p  | 78  | 76  | 2  | 3%  | 76  | 3%  | 0,0003 | 1,57 |
| miR-186-5p  | 391 | 110 | 14 | 13% | 377 | 4%  | 0,0003 | 1,53 |
| miR-149-5p  | 281 | 76  | 7  | 9%  | 274 | 3%  | 0,0003 | 1,53 |
| let-7c-5p   | 152 | 175 | 8  | 5%  | 144 | 6%  | 0,0003 | 1,44 |
| miR-326     | 42  | 94  | 1  | 1%  | 41  | 2%  | 0,0003 | 1,18 |
| let-7b-5p   | 534 | 178 | 22 | 12% | 512 | 4%  | 0,0002 | 1,10 |
| miR-92b-3p  | 190 | 69  | 3  | 4%  | 187 | 2%  | 0,0002 | 1,06 |
| miR-23a-3p  | 58  | 81  | 1  | 1%  | 57  | 2%  | 0,0002 | 0,98 |

**Supplementary Table S2. Types of interactions for 13'618 pairs from CLASH data formed by 73 miRNAs, which coupled 50 or more mRNAs.** For each miRNA-mRNA interaction from 13'618 pairs, we identify the number (percentage) of each type and number (percentage) summarized for canonical types and non-canonical types.

|                | Type of a miRNA-mRNA interaction |       |       |       |                       |                 |     |                    |                           |
|----------------|----------------------------------|-------|-------|-------|-----------------------|-----------------|-----|--------------------|---------------------------|
|                | 6-mer                            | 7-mer | 8-mer | 9-mer | Total canonical types | noncanonical_se | ed  | nose ed_9 nt_st em | Total non canonical types |
| <b>Maximum</b> | 17%                              | 28%   | 22%   | 8%    | 62%                   | 64%             | 71% | 48%                | 100%                      |
| <b>Average</b> | 6%                               | 9%    | 6%    | 2%    | 24%                   | 38%             | 22% | 17%                | 76%                       |
| <b>Minimum</b> | 0%                               | 0%    | 0%    | 0%    | 0%                    | 11%             | 2%  | 0%                 | 38%                       |

**Supplementary Table S3. The number of correctly predicted pairs according to randomly generated mRNA-miRNA interaction datasets (average of 5 datasets) and CLASH data.**

| <b>Program</b>          | <b>The average number of miRNA-mRNA interactions approved by five random patterns</b> | <b>The number of miRNA-mRNA interactions approved by CLASH data</b> |
|-------------------------|---|---|
| <b>TargetScan</b>       | 20.8 (3.6)*   | 274   |
| <b>PicTar</b>           | 33 (4.6)*   | 308   |
| <b>RNA22</b>            | 10.8 (2)*   | 145   |
| <b>PITA</b>             | 13.6 (2.4)*   | 199   |
| <b>Miranda</b>          | 35.2 (6.4)*   | 420   |
| <b>Total programmes</b> | 65.8 (10)*  | 624   |

**Supplementary Table S4. Characteristics of the prediction programmes according to the CLASH data and the 5 randomly generated patterns (average).**

| <b>Characteristics</b>                       | <b>Comparing with the CLASH data</b> | <b>Average of comparing with the 5 random patterns</b> |
|--|--------------------------------------|--|
| <b>Number of True positive interactions</b>  | 624                                  | 65.8   |
| <b>Number of «experimental» interactions</b> | 16'190                               | 16'190   |
| <b>Number of predicted interactions</b>      | 19'398                               | 19'398   |
| <b>Number of False positive interactions</b> | 18'774                               | 19'332.2   |
| <b>Number of False Negative interactions</b> | 15'566                               | 16'124.2   |
| <b>Sensitivity</b>                           | 0.039                                | 0.0041   |
| <b>Positive predictive value</b>             | 0.032                                | 0.0034   |