

# Daily Rhythmicity of Muscle-Related and Rhythm Genes Expression in Mackerel Tuna (*Euthynnus affinis*)

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**Table S1.** Gene primers used for qRT-PCR.

| Primer name | Sequence (5'-3')        | Product size/bp |
|-------------|-------------------------|-----------------|
| TRIM25      | F: CAACATGACCGCCTGATC   | 130             |
|             | R: TCTTCCCGTCCAACAAAT   |                 |
| STAT3       | F: ACCGCTCGTCTACCTCTA   | 124             |
|             | R: TAAGTATGGCTGAATAGTGC |                 |
| MBNL        | F: CAGCATCAAGCCAGTCAAA  | 106             |
|             | R: CAGCTCCGTTGCTCTTCTC  |                 |
| MSTN        | F: ACCAGCCCAGAAGACACG   | 106             |
|             | R: TTCGCAGTTTGCTCAGGATT |                 |
| CREB1       | F: TGCCCACTCCCATCTATC   | 93              |
|             | R: CTCCATCTGTGCCGTTATT  |                 |
| PER1        | F: CCAAAGGCGGTTTCAGTTA  | 144             |
|             | R: GAGGCTTCTTGTCTCCAC   |                 |
| PER3        | F: TCATCGGACGGCATAAAG   | 85              |
|             | R: TGGGTGACTGGGAAATACTC |                 |
| RORA        | F: CTGGATAGGGTGGGTGGAA  | 84              |
|             | R: CGTTGGCCCGGATTAGAG   |                 |
| REVERBA     | F: CCTACAACCATCCCACAG   | 88              |

|       |                          |     |
|-------|--------------------------|-----|
|       | R: ACCTTACATAGAAGCACCATA |     |
| CRY1  | F: GTGGGCAGCCTCCTCTTA    | 145 |
|       | R: CCGTACTTGTCTCCGTGGTC  |     |
| CRY2  | F: CTACATGAAGCTCCGTAAGC  | 108 |
|       | R: CGGTCAAAGTTTGGGTTG    |     |
| BMAL1 | F: CGTCCAGTGGTAATGTCA    | 176 |
|       | R: CATGAGTGCTTCTCCTCC    |     |
| GAPDH | F: ACACTCACTCCTCCATCTTTG | 100 |
|       | R: TTGCTGTAGCCGAACATCAT  |     |

**Table S2.** Primer names.

| Genes   | Full names of target genes                         |
|---------|--|
| TRIM25  | Tripartite motif containing 25                     |
| STAT3   | Signal transducer and activator of transcription 3 |
| MBNL    | Muscleblind like                                   |
| MSTN    | Myostatin  |
| CREB1   | cAMP responsive element binding protein 1          |
| PER1    | Period 1   |
| PER3    | Period 3   |
| RORA    | RAR-related orphan receptor A                      |
| REVERBA | Nuclear receptor subfamily 1 group D member 1      |
| CRY1    | Cryptochrome 1                                     |
| CRY2    | Cryptochrome 2                                     |
| BMAL1   | Brain and muscle arnt-like 1                       |
| GAPDH   | Glyceraldehyde-3-phosphate dehydrogenase           |

**Table S3.** Effect of light intensity and duration on white muscle rhythm genes in mackerel tuna under different weather conditions.

| Genes   | <i>P</i> value |         |              |
|---------|----------------|---------|--------------|
|         | Time           | Weather | Interactions |
| CREB1   | < 0.001        | < 0.001 | < 0.001      |
| PER1    | < 0.001        | < 0.001 | < 0.001      |
| PER3    | < 0.001        | 0.067   | < 0.001      |
| RORA    | < 0.001        | < 0.001 | < 0.001      |
| REVERBA | < 0.001        | < 0.001 | < 0.001      |
| CRY1    | < 0.001        | < 0.001 | < 0.001      |
| CRY2    | < 0.001        | < 0.001 | < 0.001      |
| BMAL1   | < 0.001        | 0.011   | 0.002        |

Results of two-way ANOVA with SPSS for measuring factors. When interactions are significant ( $P < 0.001$ ), between-group comparisons and independent samples t-tests at the same time point will be used. The same as below.

**Table S4.** Effect of light intensity and duration on red muscle rhythm genes in mackerel tuna under different weather conditions.

| Genes   | <i>P</i> value |         |              |
|---------|----------------|---------|--------------|
|         | Time           | Weather | Interactions |
| CREB1   | < 0.001        | < 0.001 | < 0.001      |
| PER1    | < 0.001        | < 0.001 | < 0.001      |
| PER3    | < 0.001        | 0.038   | < 0.001      |
| RORA    | < 0.001        | < 0.001 | < 0.001      |
| REVERBA | < 0.001        | 0.001   | < 0.001      |
| CRY1    | < 0.001        | < 0.001 | < 0.001      |
| CRY2    | < 0.001        | 0.269   | < 0.001      |
| BMAL1   | < 0.001        | 0.001   | < 0.001      |

**Table S5.** Effect of light intensity and duration under different weather conditions on the functional genes of white muscle in mackerel tuna.

| <b>Genes</b> | <b><i>P</i> value</b> |                |                     |
|--------------|-----------------------|----------------|---------------------|
|              | <b>Time</b>           | <b>Weather</b> | <b>Interactions</b> |
| TRIM25       | < 0.001               | < 0.001        | < 0.001             |
| STAT3        | < 0.001               | < 0.001        | < 0.001             |
| MBNL         | < 0.001               | < 0.001        | < 0.001             |
| MSTN         | < 0.001               | < 0.001        | < 0.001             |

**Table S6.** Effect of light intensity and duration under different weather conditions on the functional genes of red muscle in mackerel tuna.

| <b>Genes</b> | <b><i>P</i> value</b> |                |                     |
|--------------|-----------------------|----------------|---------------------|
|              | <b>Time</b>           | <b>Weather</b> | <b>Interactions</b> |
| TRIM25       | < 0.001               | < 0.001        | < 0.001             |
| STAT3        | < 0.001               | < 0.001        | < 0.001             |
| MBNL         | < 0.001               | < 0.001        | < 0.001             |
| MSTN         | < 0.001               | < 0.001        | < 0.001             |