Data Article

Data on long noncoding RNA upregulated in hypothermia treated cardiomyocytes protects against myocardial infarction through improving mitochondrial function

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A B S T R A C T

This article elaborates on cardioprotective action of hypothermia related long noncoding RNA against myocardial infarction through improving mitochondrial function, which preset by J Zhang. Herein, we provide the materials and methods used in that study. And provided the detail of dysregulation of lncRNAs under the treatment of hypothermia. Furthermore, we found that lnc-UIHTC (lncRNA upregulated in hypothermia treated cardiomyocyte, NONHSAT094064) attenuated cardiomyocytes apoptosis in vitro.

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Specifications Table

| Subject area         | Biology                      |
|----------------------|------------------------------|
| More specific subject area | Hypothermia and cardiology |

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### Value of the data

- The data provides overexpression of UIHTC inhibited H₂O₂-induced AC16 apoptosis.
- This data provides the details of differentially expressed lncRNAs of cardiomyocytes exposed on hypothermia.
- The data may stimulate further research on the function of lncRNAs stimulated in cardiomyocytes under hypothermia.

### 1. Data

The details of changed lncRNAs were listed in Table 1 (Table 1).

The primers used in the study were listed in Table 2 (Table 2).

Hierarchical clustering based on levels of lncRNAs in AC16 cell treated with hypothermia (Fig. 1A). The KEGG Pathway analysis of LncRNA-UIHTC (lncRNA upregulated in hypothermia treated cardiomyocyte, NONHSAT094064) was shown in (Fig. 1B). The full sequence of LncRNA-UIHTC has been shown in (Fig. 1C). Moreover, the Coding Potential Calculator result indicates that LncRNA-UIHTC is no-coding RNA (Fig. 1D). Then, we overexpression of UIHTC by AAV9 in rat and found that UIHTC was successfully overexpressed in rat after MI 28 days (Fig. 1E and F). Next, we overexpressed UIHTC in AC16 cells and found that UIHTC inhibited H₂O₂ induced apoptosis (Fig. 1G–I).

UIHTC expressed AC16 exhibited no significantly capacity to use and increase oxidation of glucose when trying to compensate for BPTES- and etomoxir-induced inhibition of alternative fuel pathways (i.e., glutamine oxidation and long chain fatty acid oxidation, respectively) (Fig. 2A–D).

### 2. Materials and methods

#### 2.1. Human specimens

All the fresh human tissue specimens used in this study were obtained from patients who underwent heart transplantation for heart failure at Department of Cardiovascular Surgery, General Hospital of Shenyang Military Area Command in Shenyang, Liaoning, China. The procedure of human sample collection and analysis was approved by the Ethics Committee of General Hospital of Shenyang Military Area Command.

#### 2.2. Cells culture and microarray analysis

Cell line of human adult ventricular cardiomyocytes (AC16) and microarray data has been described before [1]. The microarray data have been deposited in NCBI Gene Expression Omnibus and are accessible through GEO Series accession number GSE71361.
Table 1
Details of changed IncRNAs in hypothermia treated AC16 cells.

| Genbank accession | Regulation | Chr  | Chr strand | Fold change |
|-------------------|------------|------|------------|-------------|
| n4541             | Up         | chr22| +          | 2.16        |
| n342704           | Up         | chr17| –          | 2.66        |
| NR_002983         | Up         | chr1 | –          | 1.62        |
| n334074           | Up         | chr17| –          | 2.18        |
| n339087           | Up         | chr2 | +          | 1.59        |
| TCONS_00011996-XLOC_005510 | Up | chr6 | +          | 1.89        |
| n408293           | Up         | chr17| –          | 1.64        |
| n333380           | Up         | chr3 | +          | 1.98        |
| ENST00000365207   | Up         | chr17| –          | 1.63        |
| n334398           | Up         | chr17| +          | 1.81        |
| NR_034120         | Up         | chr7 | –          | 2.05        |
| TCONS_00025394-XLOC_012209 | Up | chr17| +          | 1.77        |
| n340430           | Up         | chr5 | –          | 1.68        |
| n337368           | Up         | chr19| +          | 1.91        |
| NR_026582         | Up         | chr3 | –          | 1.64        |
| ENST00000364127   | Up         | chr17| –          | 2.07        |
| ENST00000273411   | Up         | chr3 | –          | 1.72        |
| n333278           | Up         | chr12| –          | 1.89        |
| n407948           | Up         | chr10| –          | 1.74        |
| n339176           | Up         | chr2 | –          | 1.81        |
| ENST00000384476   | Up         | chr1 | –          | 1.57        |
| n342580           | Up         | chr18| +          | 1.98        |
| TCONS_00019243-XLOC_009074 | Up | chr11| +          | 1.44        |
| n378377           | Up         | chr7 | –          | 1.85        |
| n333449           | Up         | chr6 | +          | 1.36        |
| NR_002921         | Up         | chr2 | –          | 1.69        |
| NR_002581         | Up         | chr8 | –          | 1.57        |
| ENST00000365538   | Up         | chr1 | –          | 1.95        |
| ENST00000385251   | Up         | chr16| +          | 1.42        |
| n340431           | Up         | chr5 | –          | 1.49        |
| n342718           | Up         | chr6 | +          | 1.61        |
| n5726             | Up         | chr15| –          | 1.68        |
| n334819           | Up         | chr10| +          | 1.56        |
| n387280           | Up         | chr3 | –          | 1.55        |
| ENST00000532242   | Up         | chr11| +          | 1.36        |
| ENST00000364829   | Up         | chr1 | +          | 1.63        |
| ENST00000499503   | Up         | chr17| +          | 1.34        |
| ENST00000384770   | Up         | chr1 | +          | 1.4         |
| ENST00000384241   | Up         | chr1 | –          | 1.43        |
| ENST00000516747   | Up         | chr11| +          | 1.37        |
| ENST00000390893   | Up         | chr17| –          | 1.66        |
| n337074           | Up         | chr2 | +          | 1.41        |
| n335609           | Up         | chr17| +          | 1.52        |
| n337037           | Up         | chr21| –          | 1.34        |
| ENST00000364166   | Up         | chr14| +          | 1.45        |
| n334787           | Up         | chr4 | +          | 2.68        |
| n386326           | Up         | chr3 | +          | 1.38        |
| ENST00000442269   | Up         | chr6 | +          | 1.68        |
| n341319           | Up         | chr7 | –          | 1.35        |
| TCONS_00016056-XLOC_007446 | Up | chr9 | +          | 1.36        |
| NR_003199         | Up         | chr14| +          | 1.41        |
| n335550           | Up         | chr14| –          | 1.32        |
| n339341           | Up         | chr3 | +          | 1.59        |
| ENST00000550319   | Up         | chr12| +          | 1.37        |
| TCONS_00003553-XLOC_001325 | Up | chr2 | +          | 1.35        |
| n336002           | Up         | chr8 | –          | 2.43        |
| ENST00000425077   | Up         | chr7 | –          | 1.37        |
| n334456           | Up         | chr5 | –          | 1.45        |
| ENST00000391122   | Up         | chr15| +          | 1.4         |
| n340425           | Up         | chr5 | +          | 1.48        |
Table 1 (continued)

| Genbank accession | Regulation | Chr   | Chr strand | Fold change |
|--------------------|------------|-------|------------|-------------|
| TCONS_00029913-XLOC_014386 | Up         | chr22 | –          | 1.37        |
| NR_024333          | Up         | chr19 | –          | 1.41        |
| n323941            | Up         | chr9  | +          | 1.32        |
| ENST00000391154    | Up         | chr1  | +          | 1.46        |
| n339466            | Up         | chr21 | –          | 1.35        |
| NR_002971          | Up         | chr6  | +          | 1.7         |
| NR_002971          | Up         | chr8_cox_hap2 | +   | 1.7         |
| NR_002971          | Up         | chr8_mann_hap4 | +   | 1.7         |
| NR_002971          | Up         | chr6_qbl_hap6 | +   | 1.7         |
| NR_002971          | Up         | chr6_ssto_hap7 | +   | 1.7         |
| n338881            | Up         | chr2  | –          | 1.59        |
| OTTHUMT000000035200 | Up       | chr6_qbl_hap6 | –   | 1.33        |
| n334500            | Up         | chr14 | +          | 1.47        |
| n339072            | Up         | chr2  | –          | 1.34        |
| n340075            | Up         | chr10 | –          | 1.44        |
| ENST00000384746    | Up         | chr12 | +          | 1.32        |
| ENST00000391248    | Up         | chr15 | –          | 1.36        |
| n379365            | Up         | chr17 | +          | 1.31        |
| ENST00000462262    | Up         | chr21 | +          | 1.38        |
| n378747            | Up         | chr18 | +          | 1.34        |
| n333545            | Up         | chr19 | +          | 1.54        |
| n408024            | Up         | chrX  | +          | 1.53        |
| ENST00000384700    | Up         | chr6  | –          | 1.38        |
| n339593            | Up         | chr20 | +          | 1.34        |
| TCONS_00019032-XLOC_008957 | Up      | chr10 | –          | 1.62        |
| ENST00000363009    | Up         | chr1  | +          | 1.43        |
| TCONS_00002160-XLOC_000401 | Up    | chr1  | +          | 1.34        |
| ENST00000428367    | Up         | chr17 | –          | 1.36        |
| n406399            | Up         | chr7  | –          | 1.33        |
| ENST00000425678    | Up         | chr2  | –          | 1.31        |
| n334125            | Up         | chr7  | +          | 1.33        |
| n340509            | Up         | chr5  | –          | 1.4         |
| n340071            | Up         | chr10 | +          | 1.37        |
| n342795            | Up         | chr7  | +          | 1.34        |
| n338895            | Up         | chr2  | +          | 1.37        |
| n340154            | Up         | chr10 | –          | 1.59        |
| n326361            | Up         | chr1  | –          | 1.32        |
| ENST00000410792    | Up         | chr2  | –          | 1.37        |
| TCONS_l2_00005211-XLOC_l2_002790 | Up | chr11 | –          | 1.54        |
| n334591            | Up         | chr11 | +          | 1.35        |
| NR_002956          | Up         | chr1  | –          | 1.34        |
| n409625            | Up         | chr20 | +          | 1.31        |
| n407093            | Up         | chr20 | +          | 1.32        |
| ENST00000383967    | Up         | chr1  | +          | 1.62        |
| ENST00000364313    | Up         | chr1  | +          | 1.62        |
| TCONS_00014880-XLOC_006883 | Up      | chr8  | +          | 1.35        |
| NR_037869          | Up         | chr1  | –          | 1.34        |
| n377834            | Up         | chr5  | +          | 1.35        |
| TCONS_00024489-XLOC_011809 | Up    | chr16 | +          | 1.31        |
| ENST00000447372    | Up         | chr22 | –          | 1.31        |
| n341649            | Up         | chr9  | +          | 1.31        |
| ENST00000537889    | Up         | chr16 | +          | 1.32        |
| TCONS_00024338-XLOC_011654 | Up    | chr16 | +          | 1.39        |
| NR_003210          | Up         | chr14 | +          | 1.4         |
| n339184            | Up         | chr2  | +          | 1.32        |
| ENST00000384367    | Up         | chr1  | +          | 1.38        |
| n380676            | Up         | chr11 | –          | 1.42        |
| ENST00000515085    | Up         | chr5  | +          | 1.38        |
| n332643            | Up         | chr10 | +          | 1.41        |
| ENST00000384601    | Up         | chr3  | +          | 1.53        |
| n336606            | Up         | chr11 | –          | 1.35        |
| Genbank accession | Regulation | Chr | Chr strand | Fold change |
|-------------------|------------|-----|------------|-------------|
| ENST00000538067   | Up         | chr12 | +          | 1.33        |
| TCONS_00006915-XLOC_002730 | Up | chr3 | +          | 1.49        |
| n340869          | Up         | chr6  | +          | 1.88        |
| TCONS_00018082-XLOC_008337 | Up | chr10 | +          | 1.4         |
| ENST00000449168  | Up         | chr2  | +          | 1.4         |
| ENST00000516287  | Up         | chr20 | +          | 1.38        |
| TCONS_00019651-XLOC_009456 | Up | chr11 | −          | 1.32        |
| ENST00000416061  | Up         | chrX  | −          | 1.32        |
| n334635          | Up         | chr5  | +          | 1.39        |
| n410630          | Up         | chr1  | −          | 1.46        |
| ENST00000411067  | Up         | chr18 | −          | 1.32        |
| TCONS_00010299-XLOC_004777 | Up | chr5 | −          | 1.34        |
| NR_001285        | Up         | chr19 | +          | 1.31        |
| TCONS_00009322-XLOC_004238 | Up | chr5 | +          | 1.39        |
| ENST00000383927   | Up         | chr1  | −          | 1.35        |
| ENST00000414515  | Up         | chr9  | −          | 1.41        |
| n345970          | Up         | chr2  | +          | 1.42        |
| ENST00000516357  | Up         | chrY  | +          | 1.33        |
| ENST00000516704  | Up         | chrY  | −          | 1.33        |
| n341216          | Up         | chr7  | +          | 1.38        |
| ENST00000456346  | Up         | chr6  | −          | 1.43        |
| ENST00000410361  | Up         | chr9  | −          | 1.31        |
| TCONS_00002934-XLOC_001531 | Up | chr2 | +          | 1.32        |
| TCONS_I2_00030929-XLOC_I2_015938 | Up | chrY | −          | 1.38        |
| ENST00000384265  | Up         | chr12 | +          | 1.34        |
| TCONS_00011337-XLOC_005383 | Up | chr6 | +          | 1.35        |
| ENST00000404143-XLOC_001882 | Up | chr2 | +          | 1.36        |
| TCONS_00000574-XLOC_000920 | Up | chr1 | −          | 1.34        |
| n332690          | Up         | chr20 | −          | 1.31        |
| ENST00000432268  | Up         | chr2  | −          | 1.35        |
| n386063          | Up         | chr14 | −          | 1.36        |
| ENST00000363626  | Up         | chr11 | +          | 1.32        |
| n346101          | Up         | chrX  | +          | 1.59        |
| ENST00000384371  | Up         | chr12 | +          | 1.32        |
| n341052          | Up         | chr11 | +          | 1.32        |
| ENST00000516697  | Up         | chr1  | +          | 1.31        |
| ENST00000557144  | Up         | chr4  | −          | 1.33        |
| ENST00000384032  | Up         | chr3  | −          | 1.33        |
| TCONS_00019540-XLOC_009333 | Up | chr11 | +          | 1.31        |
| TCONS_00000713-XLOC_001151 | Up | chr1 | −          | 1.36        |
| ENST00000364243  | Up         | chr2  | −          | 1.33        |
| n378384          | Up         | chr2  | −          | 1.53        |
| ENST00000384246  | Up         | chr2  | +          | 1.34        |
| ENST00000441217  | Up         | chr2  | +          | 1.35        |
| n334057          | Up         | chr5  | −          | 1.32        |
| ENST00000411281  | Up         | chr12 | +          | 1.51        |
| NR_038970        | Up         | chr14 | −          | 1.34        |
| n406921          | Down       | chr2  | +          | 0.23        |
| n409260          | Down       | chr3  | +          | 0.41        |
| n345255          | Down       | chr14 | +          | 0.47        |
| ENST00000549251  | Down       | chr12 | −          | 0.48        |
| n342393          | Down       | chr19 | +          | 0.43        |
| n340899          | Down       | chr6  | +          | 0.54        |
| n339467          | Down       | chr3  | +          | 0.53        |
| n410890          | Down       | chr5  | +          | 0.61        |
| n342817          | Down       | chr7  | +          | 0.52        |
| n407477          | Down       | chr3  | +          | 0.53        |
| n340730          | Down       | chr5  | −          | 0.52        |
| n334786          | Down       | chr10 | −          | 0.49        |
| NR_024214        | Down       | chr19 | +          | 0.58        |
| NR_004435        | Down       | chr19 | +          | 0.58        |
| Genbank accession | Regulation | Chr  | Chr strand | Fold change |
|-------------------|------------|------|------------|-------------|
| TCONS_l2_00022861-XLOC_l2_012011 | Down | chr5 | – | 0.56 |
| n410211 | Down | chr1 | + | 0.59 |
| n385685 | Down | chr9 | – | 0.4 |
| ENST00000375210 | Down | chr9 | – | 0.51 |
| n407522 | Down | chr1 | + | 0.66 |
| n338319 | Down | chr14 | + | 0.57 |
| NR_003075 | Down | chr7 | + | 0.56 |
| n384655 | Down | chr5 | – | 0.64 |
| n337872 | Down | chr1 | – | 0.54 |
| n408031 | Down | chr3 | – | 0.64 |
| n340901 | Down | chr6 | + | 0.55 |
| n340647 | Down | chr5 | + | 0.54 |
| n384393 | Down | chr3 | – | 0.64 |
| n340510 | Down | chr17 | + | 0.48 |
| NR_004437 | Down | chr19 | + | 0.6 |
| NR_002951 | Down | chr12 | – | 0.65 |
| n342113 | Down | chr6 | – | 0.65 |
| n341217 | Down | chr7 | + | 0.6 |
| n335577 | Down | chr4 | + | 0.59 |
| n384996 | Down | chr6 | + | 0.6 |
| n383211 | Down | chr17 | – | 0.67 |
| n408051 | Down | chr2 | – | 0.49 |
| n410523 | Down | chr5 | – | 0.58 |
| n345681 | Down | chr1 | – | 0.68 |
| n335651 | Down | chr22 | – | 0.61 |
| n332602 | Down | chr1 | + | 0.52 |
| n409777 | Down | chr10 | + | 0.62 |
| n407842 | Down | chr1 | + | 0.56 |
| n405416 | Down | chr19 | + | 0.71 |
| NR_003016 | Down | chr4 | + | 0.52 |
| n338183 | Down | chr1 | – | 0.52 |
| n386362 | Down | chr4 | + | 0.5 |
| n342253 | Down | chr1 | + | 0.67 |
| n341520 | Down | chr8 | – | 0.61 |
| n341502 | Down | chr8 | – | 0.68 |
| ENST00000408820 | Down | chr4 | + | 0.63 |
| ENST00000408155 | Down | chr4 | – | 0.63 |
| n385279 | Down | chr7 | + | 0.7 |
| n340607 | Down | chr5 | + | 0.66 |
| TCONS_l2_00010617-XLOC_l2_005701 | Down | chr17 | + | 0.71 |
| NR_026705 | Down | chr5 | + | 0.57 |
| n342192 | Down | chr3 | + | 0.65 |
| n341987 | Down | chr12 | – | 0.58 |
| ENST00000459523 | Down | chr14 | + | 0.5 |
| TCONS_00029063-XLOC_013984 | Down | chr21 | + | 0.68 |
| n409199 | Down | chr3 | – | 0.75 |
| NR_028308 | Down | chr2 | – | 0.74 |
| n3383019 | Down | chr16 | + | 0.75 |
| ENST00000408329 | Down | chr4 | – | 0.52 |
| ENST00000408285 | Down | chr4 | – | 0.52 |
| NR_003608 | Down | chr22 | – | 0.76 |
| n342056 | Down | chr12 | + | 0.65 |
| n338696 | Down | chr19 | + | 0.59 |
| TCONS_00007758-XLOC_003943 | Down | chr4 | – | 0.66 |
| n407180 | Down | chr17 | – | 0.66 |
| n407319 | Down | chr3 | + | 0.75 |
| n386478 | Down | chr8 | – | 0.65 |
| n346330 | Down | chr4 | + | 0.66 |
| n342890 | Down | chr12 | + | 0.56 |
| n340068 | Down | chr10 | – | 0.68 |
| n382189 | Down | chr14 | – | 0.51 |
Table 1 (continued)

| Genbank accession | Regulation | Chr | Chr strand | Fold change |
|-------------------|------------|-----|------------|-------------|
| TCONS_00001109-XLOC_000350 | Down | chr1 | + | 0.67 |
| NR_037803 | Down | chr11 | + | 0.68 |
| n336825 | Down | chr8 | + | 0.75 |
| n332871 | Down | chr7 | + | 0.76 |
| n383770 | Down | chr2 | − | 0.44 |
| n337209 | Down | chr10 | + | 0.73 |
| NR_002922 | Down | chr5 | + | 0.71 |
| NR_002576 | Down | chr17 | − | 0.75 |
| n410156 | Down | chr3 | + | 0.73 |
| n405970 | Down | chr10 | + | 0.69 |
| n335076 | Down | chr12 | + | 0.72 |
| NR_002995 | Down | chr17 | + | 0.66 |
| ENST00000446984 | Down | chr9 | − | 0.76 |
| n385776 | Down | chrX | + | 0.7 |
| n408092 | Down | chr11 | − | 0.62 |
| n335676 | Down | chr4 | − | 0.62 |
| ENST00000459390 | Down | chr1 | + | 0.39 |
| ENST00000458828 | Down | chr1 | − | 0.39 |
| n385638 | Down | chr9 | − | 0.66 |
| TCONS_00004331-XLOC_002204 | Down | chr2 | − | 0.63 |
| ENST00000517046 | Down | chrY | − | 0.56 |
| ENST00000459234 | Down | chr2 | + | 0.59 |
| ENST00000410167 | Down | chr4 | − | 0.63 |
| n406823 | Down | chr12 | + | 0.73 |
| ENST00000408237 | Down | chr10 | − | 0.71 |
| n344778 | Down | chr15 | + | 0.67 |
| n338270 | Down | chr19 | − | 0.69 |
| n335672 | Down | chr7 | + | 0.6 |
| n332583 | Down | chr10 | − | 0.7 |
| n335635 | Down | chr1 | + | 0.69 |
| n333316 | Down | chr19 | + | 0.69 |
| n408238 | Down | chr20 | + | 0.75 |
| NR_003059 | Down | chr16 | − | 0.72 |
| TCONS_00000861-XLOC_000086 | Down | chr1 | + | 0.67 |
| n410735 | Down | chr12 | − | 0.7 |
| NR_024221 | Down | chr19 | + | 0.67 |
| ENST00000517046 | Down | chr2 | + | 0.59 |
| ENST00000553825 | Down | chr14 | + | 0.7 |
| n333463 | Down | chr5 | + | 0.71 |
| n380727 | Down | chr11 | + | 0.74 |
| n410524 | Down | chr1 | − | 0.71 |
| n385631 | Down | chr9 | + | 0.73 |
| n384424 | Down | chr4 | + | 0.63 |
| TCONS_00008434-XLOC_003881 | Down | chr4 | − | 0.76 |
| n410120 | Down | chr5 | − | 0.7 |
| NR_024218 | Down | chr19 | + | 0.65 |
| n341422 | Down | chr13 | + | 0.7 |
| n335490 | Down | chr5 | − | 0.61 |
| n409529 | Down | chr2 | − | 0.65 |
| n340230 | Down | chr4 | + | 0.76 |
| TCONS_000009541-XLOC_009280 | Down | chr12 | + | 0.65 |
| n332758 | Down | chr19 | − | 0.6 |
| n386687 | Down | chr11 | + | 0.71 |
| n338700 | Down | chr2 | − | 0.72 |
| n334497 | Down | chr12 | + | 0.68 |
| n335646 | Down | chr20 | − | 0.54 |
| n385468 | Down | chr8 | − | 0.73 |
| ENST00000459307 | Down | chr7 | + | 0.64 |
| TCONS_00001969-XLOC_000132 | Down | chr3 | − | 0.5 |
| TCONS_000013033-XLOC_0007013 | Down | chr19 | − | 0.7 |
| ENST00000459307 | Down | chr21 | − | 0.45 |
Table 1 (continued)

| Genbank accession | Regulation | Chr | Chr strand | Fold change |
|-------------------|------------|-----|------------|-------------|
| n337011           | Down       | chr15 | +          | 0.67        |
| ENST00000410505   | Down       | chr4  | +          | 0.52        |
| TCONS_00025203-XLOC_012351 | Down       | chr17 | +          | 0.68        |
| n338975           | Down       | chr2  | –          | 0.61        |
| n338468           | Down       | chr14 | –          | 0.76        |
| n384600           | Down       | chr5  | +          | 0.65        |
| ENST00000425109   | Down       | chr1  | –          | 0.71        |
| n384667           | Down       | chr5  | –          | 0.71        |
| n332927           | Down       | chrX  | +          | 0.76        |
| ENST00000381105   | Down       | chrX  | –          | 0.71        |
| n338489           | Down       | chr1  | –          | 0.58        |
| n339117           | Down       | chr2  | +          | 0.74        |
| NR_021492         | Down       | chr22 | +          | 0.62        |
| n386409           | Down       | chr6  | +          | 0.64        |
| ENST00000517242   | Down       | chr13 | –          | 0.75        |
| NR_026757         | Down       | chr15 | +          | 0.67        |
| n406648           | Down       | chr4  | +          | 0.74        |
| ENST000005033553  | Down       | chr5  | –          | 0.68        |
| TCONS_12_00002830-XLOC_12_001417 | Down       | chr1  | –          | 0.65        |
| n3837778          | Down       | chr2  | +          | 0.74        |
| NR_033931         | Down       | chr4  | +          | 0.73        |
| n341329           | Down       | chr7  | –          | 0.69        |
| n338835           | Down       | chr12 | –          | 0.65        |
| n341945           | Down       | chr12 | +          | 0.7         |
| n341914           | Down       | chr12 | –          | 0.55        |
| n332774           | Down       | chr11 | +          | 0.76        |
| n342272           | Down       | chr22 | –          | 0.7         |
| n338494           | Down       | chr14 | +          | 0.72        |
| ENST00000458806   | Down       | chr1  | –          | 0.76        |
| n410543           | Down       | chr2  | –          | 0.69        |
| n342223           | Down       | chr1  | +          | 0.63        |
| ENST00000417820   | Down       | chr21 | +          | 0.69        |
| n410892           | Down       | chr14 | +          | 0.75        |
| NR_003010         | Down       | chr12 | –          | 0.7         |
| n409093           | Down       | chr12 | +          | 0.64        |
| TCONS_00003380-XLOC_002282 | Down       | chr2  | –          | 0.67        |
| NR_0020980        | Down       | chr16 | –          | 0.68        |
| n332620           | Down       | chr10 | +          | 0.62        |
| n410123           | Down       | chr22 | –          | 0.73        |
| n325691           | Down       | chr13 | +          | 0.73        |
| ENST00000363272   | Down       | chr15 | –          | 0.69        |
| n345178           | Down       | chr12 | +          | 0.71        |
| n339370           | Down       | chr3  | –          | 0.69        |
| n410169           | Down       | chr9  | +          | 0.75        |
| ENST00000516845   | Down       | chr20 | +          | 0.74        |
| NR_023392         | Down       | chr8  | –          | 0.73        |
| n337863           | Down       | chr1  | +          | 0.73        |
| ENST00000459322   | Down       | chr9  | –          | 0.44        |
| ENST00000499250   | Down       | chr8  | –          | 0.76        |
| n410486           | Down       | chr20 | +          | 0.66        |
| n345222           | Down       | chr13 | +          | 0.71        |
| n337929           | Down       | chr1  | –          | 0.65        |
| ENST00000362760   | Down       | chr6  | +          | 0.63        |
| n341238           | Down       | chr7  | –          | 0.72        |
| ENST00000459317   | Down       | chr9  | –          | 0.48        |
| n344934           | Down       | chr6  | –          | 0.72        |
| n335516           | Down       | chr17 | –          | 0.72        |
| n341846           | Down       | chr6  | –          | 0.61        |
| n381331           | Down       | chr1  | –          | 0.6         |
| TCONS_00023251-XLOC_011554 | Down       | chr15 | –          | 0.71        |
| n340611           | Down       | chr5  | +          | 0.64        |
| Genbank accession | Regulation | Chr   | Chr strand | Fold change |
|-------------------|-----------|-------|------------|-------------|
| NR_034144         | Down      | chr17 | +          | 0.64        |
| n333320           | Down      | chr1  | +          | 0.72        |
| n342611           | Down      | chr4  | +          | 0.73        |
| ENST00000435109   | Down      | chr2  | –          | 0.71        |
| n332938           | Down      | chr2  | –          | 0.75        |
| n332918           | Down      | chr1  | +          | 0.75        |
| n3893             | Down      | chr12 | –          | 0.7         |
| n408049           | Down      | chr2  | +          | 0.75        |
| n407172           | Down      | chr5  | –          | 0.74        |
| NR_002977         | Down      | chr11 | +          | 0.76        |
| n342784           | Down      | chr11 | –          | 0.66        |
| ENST00000429933   | Down      | chr13 | +          | 0.75        |
| n406963           | Down      | chr3  | +          | 0.71        |
| n387024           | Down      | chr17 | –          | 0.66        |
| ENST00000459169   | Down      | chr21 | +          | 0.75        |
| n339642           | Down      | chr3  | +          | 0.75        |
| ENST00000410413   | Down      | chr3  | +          | 0.72        |
| NR_004387         | Down      | chr12 | +          | 0.73        |
| n333096           | Down      | chr1  | +          | 0.73        |
| ENST00000408488   | Down      | chr4  | +          | 0.41        |
| n384454           | Down      | chr4  | –          | 0.61        |
| n335600           | Down      | chr4  | +          | 0.71        |
| n339439           | Down      | chr3  | –          | 0.7         |
| ENST00000458847   | Down      | chr21 | –          | 0.4         |
| n406459           | Down      | chr3  | –          | 0.76        |
| n338422           | Down      | chr14 | –          | 0.69        |
| n340381           | Down      | chr5  | +          | 0.73        |
| ENST00000553202   | Down      | chr12 | –          | 0.69        |
| n340150           | Down      | chr10 | –          | 0.76        |
| n337962           | Down      | chr1  | –          | 0.74        |
| NR_046097         | Down      | chr1  | +          | 0.76        |
| ENST00000459257   | Down      | chr1  | +          | 0.48        |
| n336936           | Down      | chr10 | –          | 0.75        |
| n335470           | Down      | chr6  | +          | 0.72        |
| n342582           | Down      | chr18 | +          | 0.7         |
| TCONS_l2_00020697-XLOC_l2_010802 | Down   | chr4  | +          | 0.71        |
| n339794           | Down      | chr18 | –          | 0.76        |
| n342579           | Down      | chr4  | +          | 0.76        |
| ENST00000390127   | Down      | chr4  | +          | 0.67        |
| NR_026680         | Down      | chr17 | +          | 0.73        |
| n332365           | Down      | chr6  | –          | 0.71        |
| n407274           | Down      | chr13 | +          | 0.76        |
| n336583           | Down      | chr8  | –          | 0.68        |
| NR_003135         | Down      | chr4  | +          | 0.68        |
| n335585           | Down      | chr6  | –          | 0.62        |
| TCONS_l2_00011393-XLOC_l2_006157 | Down   | chr17 | –          | 0.75        |
| n409338           | Down      | chr8  | +          | 0.73        |
| ENST00000437376   | Down      | chr10 | +          | 0.67        |
| n339699           | Down      | chr3  | –          | 0.7         |
| TCONS_00025100-XLOC_012113 | Down   | chr17 | +          | 0.72        |
| ENST00000410458   | Down      | chr22 | +          | 0.63        |
| n333458           | Down      | chr2  | –          | 0.66        |
| ENST00000440803   | Down      | chr10 | –          | 0.75        |
| n407951           | Down      | chr7  | +          | 0.71        |
| n340550           | Down      | chr5  | +          | 0.66        |
| NR_002953         | Down      | chrX  | +          | 0.73        |
| TCONS_l2_00031062-XLOC_l2_015962 | Down   | chrY  | –          | 0.7         |
| n385291           | Down      | chr7  | –          | 0.71        |
| n332754           | Down      | chr19 | –          | 0.72        |
| n335563           | Down      | chr5  | –          | 0.68        |
| n342719           | Down      | chr17 | –          | 0.73        |
| Genbank accession | Regulation | Chr | Chr strand | Fold change |
|-------------------|------------|-----|------------|-------------|
| TCONS_00010981-XLOC_004915 | Down | chr5 | – | 0.68 |
| n405896 | Down | chr4 | + | 0.7 |
| n338326 | Down | chr14 | + | 0.65 |
| ENST00000539116 | Down | chr12 | + | 0.72 |
| n334838 | Down | chr11 | – | 0.67 |
| n339111 | Down | chr16 | – | 0.64 |
| TCONS_00011856-XLOC_005347 | Down | chr6 | + | 0.62 |
| n382989 | Down | chr16 | + | 0.66 |
| ENST00000408148 | Down | chr4 | – | 0.38 |
| ENST00000408407 | Down | chr4 | – | 0.38 |
| n408284 | Down | chr11 | – | 0.66 |
| n340108 | Down | chr10 | + | 0.69 |
| n408057 | Down | chr21 | – | 0.73 |
| n335665 | Down | chr12 | – | 0.69 |
| NR_003086 | Down | chr10 | + | 0.74 |
| n341449 | Down | chr13 | + | 0.62 |
| ENST00000560295 | Down | chr8 | – | 0.71 |
| n336585 | Down | chr1 | – | 0.73 |
| TCONS_12_00014965-XLOC_12_008329 | Down | chr2 | – | 0.71 |
| n381011 | Down | chr12 | – | 0.69 |
| ENST00000516262 | Down | chr19 | + | 0.76 |
| n337724 | Down | chrX | – | 0.62 |
| ENST00000365465 | Down | chr12 | – | 0.76 |
| n339340 | Down | chr3 | – | 0.76 |
| n335618 | Down | chr7 | + | 0.7 |
| n383697 | Down | chr2 | + | 0.73 |
| NR_027451 | Down | chr20 | – | 0.71 |
| n386477 | Down | chr8 | – | 0.61 |
| n381720 | Down | chr11 | – | 0.75 |
| NR_003689 | Down | chr5 | + | 0.75 |
| n385130 | Down | chr7 | + | 0.69 |
| n338054 | Down | chr15 | + | 0.73 |
| n339273 | Down | chr3 | + | 0.66 |
| n339125 | Down | chr16 | + | 0.75 |
| TCONS_00007073-XLOC_002996 | Down | chr3 | + | 0.71 |
| n335629 | Down | chr11 | + | 0.75 |
| n338352 | Down | chr14 | + | 0.71 |
| TCONS_00020239-XLOC_009920 | Down | chr12 | + | 0.72 |
| n407424 | Down | chr7 | + | 0.75 |
| n410028 | Down | chr11 | + | 0.73 |
| n381557 | Down | chr10 | + | 0.64 |
| n409073 | Down | chr11 | + | 0.76 |
| n340600 | Down | chr17 | + | 0.62 |
| n384785 | Down | chr5 | – | 0.67 |
| n341705 | Down | chr9 | + | 0.71 |
| n346209 | Down | chr1 | – | 0.69 |
| n410553 | Down | chr10 | + | 0.73 |
| n337716 | Down | chr15 | + | 0.72 |
| ENST00000455464 | Down | chr1 | + | 0.7 |
| n407438 | Down | chr14 | + | 0.71 |
| n335719 | Down | chr21 | + | 0.74 |
| n341228 | Down | chr7 | + | 0.69 |
| ENST00000365473 | Down | chr6 | + | 0.64 |
| NR_026680 | Down | chr17_ctg5_hap1 | – | 0.75 |
| n339622 | Down | chr3 | + | 0.67 |
| ENST00000453508 | Down | chrX | + | 0.73 |
| n332887 | Down | chr12 | – | 0.74 |
| n405865 | Down | chr10 | + | 0.75 |
| n342118 | Down | chr6 | + | 0.61 |
| n407887 | Down | chr20 | – | 0.72 |
| ENST00000412312 | Down | chr2 | – | 0.73 |
| Genbank accession | Regulation | Chr  | Chr strand | Fold change |
|-------------------|------------|------|------------|-------------|
| n385370           | Down       | chr8 | +          | 0.63        |
| n407311           | Down       | chr1 | –          | 0.74        |
| TCONS_00030033-XLOC_014513 | Down       | chr7_gl000195_random | – | 0.73        |
| n342861           | Down       | chr9 | –          | 0.75        |
| n337282           | Down       | chr11| +          | 0.68        |
| NR_028379         | Down       | chrX | –          | 0.74        |
| n345003           | Down       | chr8 | –          | 0.69        |
| n383521           | Down       | chr19| –          | 0.71        |
| ENST00000424474   | Down       | chr1 | +          | 0.75        |
| n345156           | Down       | chr11| –          | 0.76        |
| n332921           | Down       | chr5 | –          | 0.72        |
| n381233           | Down       | chr1 | +          | 0.75        |
| n332826           | Down       | chr9 | –          | 0.76        |
| n337780           | Down       | chrX | –          | 0.62        |
| n340463           | Down       | chr17| –          | 0.74        |
| n340776           | Down       | chr5 | –          | 0.74        |
| n332637           | Down       | chr4 | –          | 0.68        |
| n339112           | Down       | chr16| –          | 0.74        |
| n333868           | Down       | chr17| +          | 0.74        |
| n326264           | Down       | chr1 | –          | 0.63        |
| n384227           | Down       | chr3 | –          | 0.72        |
| n339624           | Down       | chr20| +          | 0.74        |
| ENST00000516836   | Down       | chr15| +          | 0.73        |
| ENST00000401195   | Down       | chr13| +          | 0.73        |
| n337637           | Down       | chrX | +          | 0.71        |
| n334856           | Down       | chr2 | –          | 0.73        |
| ENST00000458939   | Down       | chr5 | +          | 0.68        |
| n326195           | Down       | chr1 | –          | 0.74        |
| ENST00000533009   | Down       | chr11| –          | 0.7        |
| n341273           | Down       | chr7 | –          | 0.75        |
| n335663           | Down       | chr3 | +          | 0.73        |
| n384440           | Down       | chr4 | –          | 0.69        |
| n339680           | Down       | chr3 | –          | 0.55        |
| n384435           | Down       | chr4 | +          | 0.73        |
| ENST00000459440   | Down       | chr7 | +          | 0.72        |
| n344955           | Down       | chr7 | –          | 0.75        |
| ENST00000408341   | Down       | chr3 | –          | 0.76        |
| n345418           | Down       | chr1 | +          | 0.71        |
| n338521           | Down       | chr14| –          | 0.74        |
| n334200           | Down       | chr17| +          | 0.69        |
| n382511           | Down       | chr15| –          | 0.72        |
| n342042           | Down       | chr6 | –          | 0.74        |
| ENST00000458919   | Down       | chrX | +          | 0.74        |
| ENST00000516343   | Down       | chr5 | –          | 0.75        |
| n335510           | Down       | chr20| –          | 0.75        |
| ENST00000555853   | Down       | chr14| –          | 0.76        |
| n338173           | Down       | chr22| +          | 0.72        |
| ENST00000384483   | Down       | chr17| –          | 0.71        |
| n386264           | Down       | chr2 | +          | 0.67        |
| n332849           | Down       | chr17| –          | 0.75        |
| ENST00000390855   | Down       | chr1 | –          | 0.75        |
| ENST00000390928   | Down       | chr1 | –          | 0.75        |
| ENST00000391148   | Down       | chr7 | +          | 0.75        |
| n339455           | Down       | chr3 | –          | 0.68        |
| n341491           | Down       | chr8 | +          | 0.65        |
| NR_002936         | Down       | chr6 | –          | 0.74        |
| n341245           | Down       | chr7 | –          | 0.61        |
| ENST00000459168   | Down       | chr18| +          | 0.76        |
| n339122           | Down       | chr2 | –          | 0.71        |
| n381271           | Down       | chr1 | +          | 0.75        |
**Table 1** (continued)

| Genbank accession | Regulation | Chr | Chr strand | Fold change |
|-------------------|------------|-----|------------|-------------|
| n332616           | Down       | chr10| +          | 0.71        |
| n333506           | Down       | chr7 | –          | 0.76        |
| NR_003021         | Down       | chr14| –          | 0.73        |
| n332612           | Down       | chr1 | –          | 0.67        |
| n384625           | Down       | chr5 | –          | 0.74        |
| ENST00000459540   | Down       | chr1 | +          | 0.76        |
| n385115           | Down       | chr7 | –          | 0.74        |
| NR_004398         | Down       | chr2 | –          | 0.76        |
| n339305           | Down       | chr16| +          | 0.75        |
| n342319           | Down       | chr14| +          | 0.72        |
| n408176           | Down       | chr2 | –          | 0.76        |
| n384541           | Down       | chr4 | +          | 0.67        |
| n382184           | Down       | chr14| +          | 0.74        |
| TCONS_00015557-XLOC_007549 | Down   | chr9 | +          | 0.76        |
| n323966           | Down       | chr9 | –          | 0.71        |
| n339119           | Down       | chr2 | –          | 0.76        |
| ENST00000515929   | Down       | chr2 | –          | 0.76        |
| TCONS_00016238-XLOC_007621 | Down  | chr9 | +          | 0.74        |
| n337552           | Down       | chr2 | –          | 0.75        |
| n339967           | Down       | chr4 | +          | 0.64        |

**Table 2**
The primers used in the study.

| Primer          | F: 5′ | R: 5′                  |
|-----------------|-------|------------------------|
| 18s             | CGGCTACACATCAAGGAA3′ | GCTGGAATTACCGCGGCT3′ |
| NONHSAT094064   | TCCGGAGCTGGTGCTGATAA3′ | TGAAGAATGTGCTGGGTCAAA3′ |
| Ppargc1a        | CATGTGCGACGCAAGACTCTG3′ | GAGGGCGCTAGCCAAGT3′ |
| Ppargc1b        | TGAAGTGTTGCTGGAGGATTG3′ | CATAGCTGCCGCTGGG3′ |
| Nrf1            | CCTCAAACTGCAACCAGCAAA3′ | GCTTCTGCCGAGGTGGAAGA3′ |
| Erra            | GAGGGAGGGAAGGCGAAGTACA3′ | CAGGTTCAAAACAGGGCAGAA3′ |
| Tfam            | CAAAAGACTCGTGACAAAGCAAA3′ | CTTGAGGCATCCTCTTCCTCC3′ |
| ME1             | CTGCTGACACGGGAAACCCTC3′ | CTTGAGCAGCCTCTTGCTG3′ |
| ALG10B          | GCATCTCTTTCCTCCGTGG3′ | CTTGAGGCAGCCTCTTGCTG3′ |
Fig. 1. UIHTC protects against MI. A, Hierarchical clustering based on levels of LncRNAs in AC16 cell treated with hypothermia or not. B, KEGG Pathway analysis of LncRNA-UIHTC. C, The full sequence of LncRNA-UIHTC. D, The Coding Potential Calculator result indicates that LncRNA-UIHTC is no-coding RNA. E, Real-time PCR quantification of UIHTC expression in indicated days. *** p < 0.001 vs AAV9-Control. F, in situ hybridization showing staining of UIHTC in cardiac myocytes (scale bar represents 100 µm). G, H, Apoptosis rate of AC16 cells was decreased in UIHTC transfected cells. *, p < 0.05 vs Vector H2O2. I, Caspase 3, Bcl-2 and Bax were determined by Western blot in indicated cells. J, Quantitation of Cleaved caspase3 and GAPDH. *, p < 0.05 vs Vector PBS; **, p < 0.01 vs Vector H2O2. K, Quantitation of Bcl-2 and GAPDH. **, p < 0.01 vs Vector PBS; ##, p < 0.01 vs Vector H2O2. L, Quantitation of Bax and GAPDH. *, p < 0.05 vs Vector H2O2.
2.3. Gene silencing and plasmid transfection

Synthetic small interfering RNA (siRNA; scrambled, PGC1α and UIHTC -targeting siRNA) were purchased from Genepharma Co. (Shanghai, China). The sequences of siRNA against PGC1α are shown as follow: siPGC1α #1 forward: GCCAAACCAACAACUUUAUUU; reverse: AUAAAGUU-GUGGUUUGCUU. The sequences of siRNA against UIHTC are shown as follow: si UIHTC #1 forward: GUGCUGAUAACAGCGGAAUTT; reverse: AUUCCGCUGUUAUCAGCACTT; si UIHTC #2 forward: CGCUACUGAUCACCAAGUATT; reverse: UACUUGGUGAUCAGUAGGTT. The transfection of siRNAs was performed according to the manufacturers’ instructions. For the plasmid construction, the full-length of UIHTC was subcloned into an XhoI/EcoRI site of a transposon-based pEX-2 vector.

2.4. in situ hybridization

For in situ hybridization, the probe used for detecting UIHTC-labeled digoxin was designed and synthesized by Takara (Dalian, China). The probe sequence was designed as 5DigN/TACTTGGTGATCAGTAGCGCT/3Dig_N. Hybridization was performed using the in situ hybridization Kit (Boster Bio-Engineering Company, Wuhan, China) according to the manufacturer’s instructions.

2.5. Real-time PCR analysis

The RNA of each sample was extracted from the infarction and border zone. Real-time PCR was performed using a SYBR Green PCR Kit (Applied Biosystems) and an ABI 7900HT Fast Real-Time PCR System (Applied Biosystems). The sequences of primers used were listed in Table 2.

2.6. Western blot analysis

The protein of each sample was extracted from the infarction and border zone. Western blot analysis was carried out as described previously [2]. The nitrocellulose filter membranes were incubated overnight at 4 °C with diluted antibodies against Caspase 3 (1:1000, CST), Bcl-2 (1:200, Santa Cruz), Bax (1:200, Santa Cruz), or PGC1α (1:200, Santa Cruz).

2.7. Masson trichrome staining

Masson trichrome staining was carried out as described previously [3]. Briefly, Paraffin-embedded tissue samples were sectioned (3 μm) and Masson’s trichrome staining (Baso Diagnostics Inc. Zhuhai, China) was performed following the manufacturer’s instruction.
2.8. Detection of myocardial cell apoptosis of myocardial cell apoptosis

After heart tissue section, myocardial apoptosis was detected using terminal deoxynucleotidyl-transferase-mediated dUTP nick end labeling (TUNEL) (Roche, Basel, Switzerland).

2.9. AAV9-mediated gene expression

The sequence of human UIHTC was cloned into the p3\times\text{Flag} CMV vector. AAV9-EGFP and AAV9-EGFP- UIHTC were prepared by Hanbio Biotechnology Co., Ltd. (Shanghai, China).

2.10. Myocardial infarction model and experimental design

MI rat model was established as described previously [4]. The rats were anesthetized with 1% sodium pentobarbital (50 mg/kg). Myocardial ischemia surgery was performed by exposing the heart with a left thoracic incision. A silk ligature was placed around left anterior descending coronary artery. Immediately after ligation, 30 μl of recombinant AAV9 vector (AAV9-UIHTC or AAV9-control; \(1 \times 10^{11} \text{vg per animal}\)) was injected around the infarction region.

2.11. Echocardiography

Structural and functional parameters were assessed in sedated (Isoflurane 1.0%) rats by echocardiography (Visualsonics VEVO 2100). Under anesthesia, the chest was shaved, and two-dimensional echocardiography was performed using our echocardiographic. M-mode and B-mode images were collected at baseline, as well as at 2, and 4 weeks. The LV ejection fraction (%EF) and fractional shortening (%FS) were automatically calculated by the echocardiographic system.

2.12. Measurement of endogenous ROS level

The intracellular ROS levels were detected by labeling \(2 \times 10^5\) AC16 cells with redox-sensitive probes CellRox (5 μM) (Life Technologies) for 30 min at 37 °C. Then the cells were washed twice and resuspended in 0.2 ml PBS. Fluorescence of labeled cells was analyzed by flow cytometry.

2.13. ATP measurement

The ATP content in cells was determined using a Luciferase-based Bioluminescence Assay Kit (Beyotime, Haimen, China) following the manufacturer's instruction. The protein of each sample was extracted from the infarction and border zone.

2.14. Cellular GSH, NADPH assays

The intracellular NADP/NADPH ratio were determined using a NADP/NADPH Quantitation Colorimetric Kit (Biovision) according to the manufacturer instructions. For measurement of GSH content, a Glutathione (GSH) Assay Kit (Beyotime, Haimen, China) was used as recommended instructions. The protein of each sample was extracted from the infarction and border zone.

2.15. JC-1 assay

AC16 cells mitochondrial membrane potential was measured by mitochondrial membrane potential detection kit (JC-1) (Beyotime, Haimen, China).

2.16. Metabolic assays

Oxygen consumption rate (OCR) and Extracellular acidification rate (ECAR) were evaluated using the Seahorse XF96 extracellular flux analyzer. One hour before XF assay, AC16 cells (50,000/well) were equilibrated with unbuffered DMEM and maintained in 37 °C for PH stabilization. Analyses were performed both at basal conditions and after injection of OLI (2 μM), FCCP (0.25 mM), Antimycin A (0.5 mM) at indicated time points.
Metabolic dependence was analyzed by XFp Mito Fuel Flex Test kit. Analyses were performed both at basal conditions and after injection of BPTES (3 µM), ETO (4 mM) and UK5099 (2 µM) at indicated time points according to manufacturer’s instructions.

3. Statistical analysis

RVM t-test was applied to filter the differentially expressed IncRNAs for the control and hypothermia treated group because the RVM t-test can raise degrees of freedom effectively in the cases of small samples. After the significant analysis and FDR analysis, we selected the differentially expressed genes according to the p-Value threshold. p Value < 0.05 was considered as significant difference. Results are presented as mean ± SD. Unpaired two-tailed Student’s t-test or one-way ANOVA analyzed all the data. Statistical significance was set at p < 0.05. Statistical analysis was carried out using Prism Software (GraphPad).

Transparency document. Supplementary material

Transparency data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.01.052.

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