SUPPLEMENTAL MATERIAL

EXPANDED METHODS

Patient Sample Collection   For heart failure patients, left ventricle samples, at the level of the anterior papillary muscle, were collected in the operating room and transported in ice-cold cardioplegia, flash frozen within 20 minutes of excision, and stored at -80°C prior to utilization. For the NF set, hearts were arrested *in situ* using ice-cold cardioplegia solution, transported on wet ice, and full- thickness LV samples flash frozen in liquid nitrogen within 95 minutes of explantation. Though individual humans can differ considerably in their 'chronotype' with associated differences in underlying circadian gene expression patterns[1], we have no information of the 'chronotypes' of the patients whose heart tissues were studied.

Reason Why Non-failing Hearts were Rejected for Transplantation   Twenty six of twenty seven 'control' hearts were non-failing but were not suitable for transplantation for a variety of reasons; donor age (over 50) 11; cardiac 'quality' (assessed by ultrasound, typically based upon systolic function or ventricular wall thickness) or HX of CVD or hypertension 11; one each malignancy, neurocardiogenic shock, Ehlers-Danlos syndrome, or drug overdose. One non-failing heart was en route for transplantation but acute instability of the intended recipient precluded transplant surgery

Data Processing   Local collection time was converted to fractional hours and normalized relative to the Eastern Standard Time (EST) of sunrise as reported by United States Naval Observatory (http://www.usno.navy.mil/USNO/astronomical-applications), after correction from Daylight Savings to Eastern Standard Time when appropriate for the date (day/month/year) of sample collection. With Hours After Sunrise (HASR) set at 0 for sunrise, and the yearly average for time of sunrise in Pittsburgh at approximately 6:18 AM EST, one can relate the HASR to the

yearly average of the local EST TOD by adding 6.3 hours. In addition, a prior report [2] referenced time of day sample collection in Vienna Austria , whereas this study reports as hours after sunrise in Pittsburgh. While Vienna has a higher latitude and more variable year-round length of day / average TOD for sunrise, one can reasonably approximate Pittsburgh acrophase reported as HASR to Vienna TOD by adding 6.3 hours to the Pittsburgh HASR data.

Supplemental References:

1.Brown SA, Kunz D, Dumas A, Westermark PO, Vanselow K, Tilmann-Wahnschaffe A, Herzel H, Kramer A. Molecular insights into human daily behavior. *Proc Natl Acad Sci*. 2008;105:1602-7.

2. Leibetseder V, Humpeler S, Svoboda M, Schmid D, Thalhammer T, Zuckermann A, Marktl W, Ekmekcioglu C. Clock genes display rhythmic expression in human hearts. *Chronobiol Int*. 2009;26:621-36.

A) COMMERCIAL SOURCE PRIMERS

QIAGEN QUANTITECT PRIMER	GENE	QIAGEN QUANTITECT PRIMER	GENE
QT00011844	ARNTL	QT00001022	KCNJ2
QT00077231	ATP2A2	QT01157996	KCNJ8
QT00053480	CACNA1C	QT00039396	KCNK1
QT00055755	DBP	QT00016065	KCNQ1
QT01192646	GAPDH	QT00061411	KCNS3
QT00224112	KCNA4	QT00043449	KLF15
QT01003177	KCNA5	QT00013944	NFIL3
QT01003184	KCNA7	QT00000413	NR1D1
QT00014749	KCNB1	QT00011207	PER2
QT01669150	KCNC4	QT00066080	SCN1B
QT01874740	KCND3	QT00091812	SCN5A
QT01003254	KCNH2	QT01886675	SIRT1
QT00016254	KCNIP2	QT00075376	SL8A1

B) SELF-DESIGNED PRIMERS

GENE	FORWARD PRIMER (REFERENCE NUCLEOTIDES)	REVERSE PRIMER (REFERENCE NUCLEOTIDES)	GENEBANK REFERENCE
ARNTL	GCTTTGAGGTGACCAAGTCC (223-238)	TCTGCCATTGGATGATCTGA (467-448)	NM_001178.5
DBP	CGAGACCTTTGACCCTCGAAGAA (1216-1237)	GACCGCTTGGCTGCCTCGTT (1371-1352)	NM_001352.4
NR1D1	CCGTGACCTTTCTCAGCATGA (2011-2031)	CACTGTCTGGTCCTTCACGTTG (2116-2095)	NM_021724.4
PER2	CTGCAAACCTGGCACTTCTC (3300-3319)	GTGTCTGAGGGTTCATCACG (3368-3349)	NM_022817.2

Table s1. RT-PCR Primers

GROUP	RAYLEIGH Z STATISTIC	RAYLEIGH CRITICAL VALUE	Rayleigh Ho:	Ho Accepted (Statistic < Critical Value)?
F1	1.885	2.971	Ho: data is uniformly distributed	Yes
F2	0.553	2.976		Yes
NF	1.215	2.988		Yes

GROUP	RAO SPACING STATISTIC	RAO p<0.05 SPACING VALUE	Rao Ho:	Ho Accepted?
F1	116.9	152	Ho: data is uniformly distributed	Yes
F2	134.2	155		Yes
NF	111.1	158		Yes

Table s2: Rayleigh and Rao Spacing test statistics. Uniformity Testing; Temporal Distribution of Sample Collection. Ho Accepted when (Statistic < Critical Value).
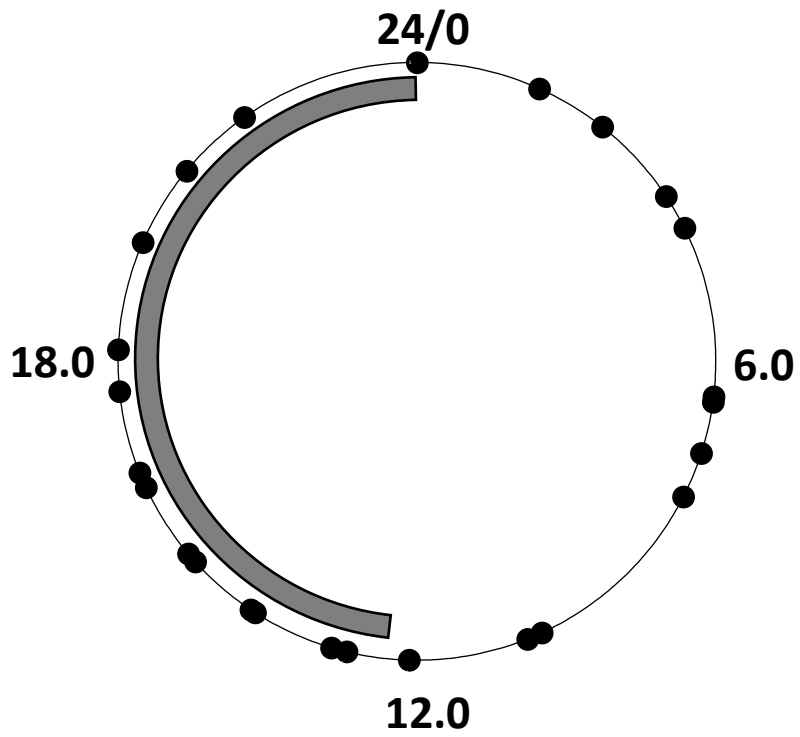
Figure s1. Time of collection of human non-failing heart samples. Data in hours after sunrise (HASR). n=27. Symbols as in Figure 1.
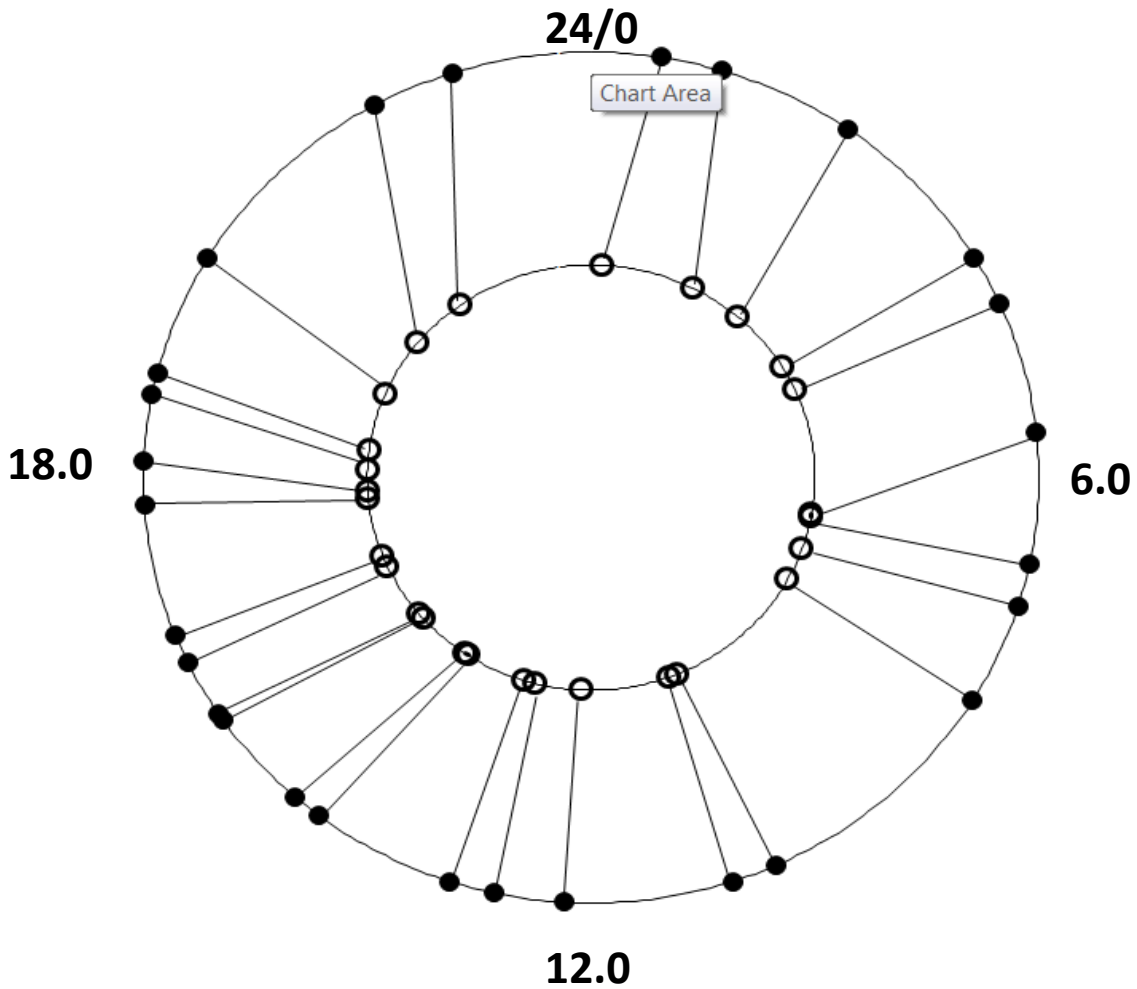
Figure s2. Temporally matched set of 27 failing and non-failing human heart samples. Inner circle; non-failing samples, each open dot represents collection time of one sample (n=27). Outer circle; each closed dot represents one sample from data presented in Figure 2 (n=27) chosen to temporally match one non-failing sample.