Supplementary Information for the paper "Natural entropy fluctuations discriminate similar looking electric signals emitted from systems of different dynamics"

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This supplementary information provides additional arguments to support the interpretation for the distnction between SD and H discussed in the main text. It also provides the results when (i) the 15 min records are divided in segments of length 180 or 120 beats and (ii) after applying a detection algorithm which excludes the "outliers". Furthermore, we demonstrate that the δS-value maximizes when the lenght of a sliding time-window becomes comparable to the period of an "oscillating" background. We also provide Tables for the complexity measures for all patients discussed in the main text as well as the results of their distinction from SD. The values of the (i) Approximate Entropy, (ii) Sample Entropy and (iii) Entropy in Natural time of all SD and H, are also presented. Finally, we discuss the quality of data as well as give some additional comments on points discussed in the main text.

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I. ADDITIONAL COMMENTS TO SUPPORT THE INTERPRETATION FOR THE DISTINCTION BETWEEN SD AND H

The plausibility of the interpretation suggested in the main text for the ECG is considerably strengthened by the following remarks. Recall that the H_{min}-values for $\lambda_s(RR)$ and $\lambda_L(RR)$ have been determined *empirically* by selecting the smallest values among the 10 H. We may overcome this empirical selection, however, as follows: We divide each ECG in (equal and non-overlapping) segments of length (l) significantly larger than the time-window of 60 beats (e.g., l=180 or 120 beats, see Tables I and II, respectively) and calculate the corresponding measures $[\lambda_s(RR)]_l$ and $[\lambda_L(RR)]_l$ for the various segments labeled by l. The mean values $\langle\lambda_k(RR)\rangle_l$ for each individual, agree more or less with the values that have been obtained in the main text (i.e., when the time-window swept through the whole record); their corresponding standard deviations (s.d.) provide, of course, a measure of the variability of each of these two ratios among the various segments studied in each record. Comparing the values of $\min\{[\lambda_s(RR)]_l\}$ and $\min\{[\lambda_L(RR)]_l\}$ (see the Tables I and II) to $\lambda_s(\mathcal{M})$ and $\lambda_L(\mathcal{M})$, respectively, we find the following: In H (with a possible exception of sel16795, which might be due to the fact that he has the smallest length, i.e., 760 beats, among the H), the values of $\min\{[\lambda_k(RR)]_l\}$ significantly exceed $\lambda_k(\mathcal{M})$, respectively, as they should. On the other hand, most SD (marked with 'c' and 'd' in Table I) exhibit $\min\{[\lambda_k(RR)]_l\}$ values which are smaller than (or equal to) $\lambda_k(\mathcal{M})$, respectively. (The values in bold, in both Tables I and II, indicate the minority of cases of SD in which the resulting $\min\{[\lambda_k(RR)]_l\}$ values exceed $\lambda_k(\mathcal{M})$.) Interestingly, all these (21 or 22 out of 24) SD cases coincide with those already marked with 'a' in Table I of the main text on the basis of the empirically determined $H-$limits of $\lambda_s(RR)$ and $\lambda_L(RR)$. Thus, the essence of our findings could be summarized as follows: When a time-window sweeps through the *whole* record available, the vast majority of SD exhibits $\lambda_s(RR)$- and $\lambda_L(RR)$- values which are significantly smaller than those in H (and hence SD are distinguished from H). This finding might stem from the fact that some segments of the SD records exhibit values of these measures that are comparable with those of a Markovian behaviour.

The same conclusions are drawn irrespective if we use a detection algorithm to exclude 'outliers' from the records. In the third column (labelled with a superscript 'b') of Table I we present the values obtained after applying such a detection algorithm. More precisely a moving window average filter was applied. For each set of five contiguous NN intervals, a local mean was computed, excluding the central interval. If the value of the central interval was greater than 1.5 the local average, it was considered to be an outlier and excluded from the NN interval series. This algorithm is analogous to the one used by Ivanov et al.[1].

Study of the δS-values for time-series with a "sinusoidal" background. In Fig.1, we show the δS-value calculated when a time-window of length 3-100 beats is sliding through the time series given by

$$x_k = a + b\sin(2\pi k/T), \tag{1}$$

or

$$y_k = \mu + \sigma\sin(2\pi k/T)\eta, \tag{2}$$

where η is an exponentially distributed random variable of unit mean and standard deviation. The amplitude of

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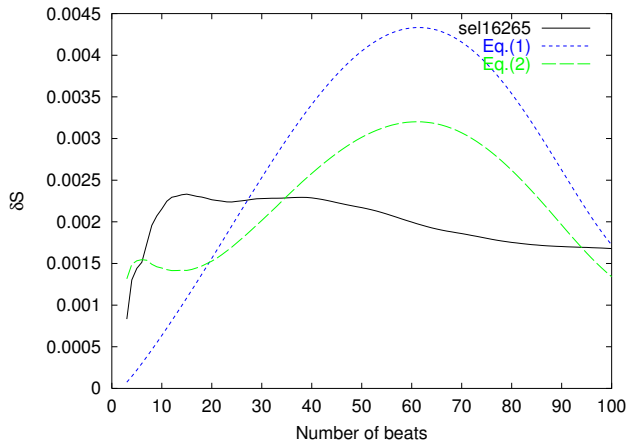

FIG. 1: (color) The δS-values versus the time-window length for one H (sel16265) together with those obtained using Eq.(1) (dotted blue) or Eq.(2) (broken green). Note that *no* maximum at aroung 60 beats appears in the case of H.

the "oscillation" b or σ is comparable to the standard deviation of the RR-intervals in ECGs (and the "period" T of the background is 60 beats). The main result of Fig.1 could be summarized as follows: when the length of the sliding time-window becomes equal to the "period" (T=60 beats) of the "oscillating" background, the δS-value becomes maximum. (Note that the window length corresponding to the maximum amplitude is practically equal to that observed *if* the "oscillating" background were solely present; the latter case for the sake of comparison is also plotted in blue in Fig.1.)

II. APPROXIMATE ENTROPY (AE) SAMPLE ENTROPY (SE) AND ENTROPY IN NATURAL TIME (S)

AE and SE are based on two input parameters: the sequence length m and the tolerance level r. The smallest values of entropy correspond to perfectly regular sequences, since the output of these algorithms provides a likelihood measure that two sequences (within tolerance level r) remain close to at the next point. Note that as r decreases both AE and SE increase, because the criterion for sequence matching becomes more stringent (see Ref.19 of the main text).

In Fig. 2, we plot the values of AE calculated for r=0.2STD and m=2 (as recommended in the program `apen`[2]) and SE, again for m=2, and r=0.2STD (by means of the program `sampen`[3]) along with the S-values for all SD and H discussed in the main text. Note that no distinction of *all* individuals can be achieved, although the average values of the two groups actually result to be different (cf. this still holds if we calculate AE for r=0.65STD as recommended in Ref.20 of the main text). This shows the necessity of using the S-fluctuations -and their ratios- as mentioned in the last paragraph of Section I of the main text.

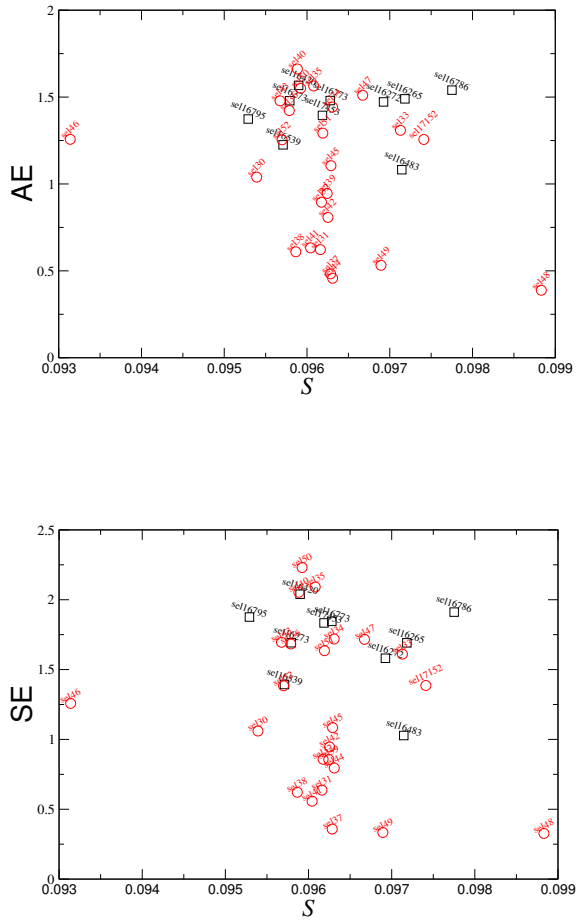

FIG. 2: (color) The values (for m=2,r=0.2STD) of AE, SE versus S calculated for all SD and H discussed in the main text

III. THE DATA ANALYZED

Table III shows the values of λ, ρ, ν and $\overline{\delta S}_{3-4}(QT)$ for all patients associated with ST-change, i.e., the two groups: EST and MST. Table III presents the corresponding values for the patients associated with Arrythmia (ARR), i.e., the two groups: MIT and MSV, while the relevant results for both SD and H can be found in Table I of the main text. The values of λ_{shuf} and ρ_{shuf} of all individuals are given in Tables V to VII).

We now discuss the quality of ECG data. Among the 101 individuals investigated, five patients have been identified as "outliers". The appearance of such "outliers" is not surprising (see below) when using (as we did) an automatic threshold detector [4–7] for the allocation of the intervals. More precisely, their recognition was made as

TABLE I: The resulting values of the ratios $\lambda_s(RR)$ and $\lambda_L(RR)$ when using segments of length l=180 beats and then calculating their mean and minimum values.

signal	$\lambda_s(RR)$				$\lambda_L(RR)$			
	$\lambda_s(RR)^a$	$\lambda_s(RR)^b$	$\langle\lambda_s(RR)\rangle_l$	$\min\{[\lambda_s(RR)]_l\}$	$\lambda_L(RR)^a$	$\lambda_L(RR)^b$	$\langle\lambda_L(RR)\rangle_l$	$\min\{[\lambda_L(RR)]_l\}$
sel16265	1.72	1.73	1.69	1.52	2.38	2.40	1.78	0.92
sel16272	1.69	1.66	1.67	1.56	1.35	1.44	1.31	1.12
sel16273	1.61	1.60	1.60	1.52	2.69	2.67	2.50	1.11
sel16420	1.51	1.54	1.50	1.43	1.74	1.80	1.80	1.37
sel16483	1.43	1.38	1.40	1.30	2.37	2.51	2.19	1.44
sel16539	2.00	2.10	2.02	1.73	1.94	2.08	1.92	1.03
sel16773	1.92	1.93	1.90	1.66	2.61	2.64	2.26	1.52
sel16786	1.71	1.78	1.76	1.54	1.57	1.70	1.51	0.95
sel16795	1.77	1.81	1.77	1.67	0.99	1.10	0.82	0.41[e]
sel17453	1.87	1.91	1.90	1.85	1.67	1.73	1.68	0.93
sel30	1.11[c]	1.12	1.17	1.03	0.89	1.06	1.38	**1.21**
sel31	0.96[c]	0.96	0.97	0.88	0.34[d]	0.34	0.35	0.28
sel32	0.96[c]	1.12	1.28	0.93	0.67[d]	0.95	1.32	0.39
sel33	1.14[c]	0.90	1.07	0.92	0.77	0.74	0.87	**0.77**
sel34	1.87	2.07	1.99	**1.50**	3.04	3.48	2.82	**1.32**
sel35	1.12[c]	1.13	1.14	1.07	0.52[d]	0.58	0.56	0.44
sel36	1.31[c]	1.30	1.33	1.16	0.62[d]	0.63	0.64	0.48
sel37	0.92[c]	0.91	0.94	0.75	0.71[d]	0.78	0.69	0.51
sel38	0.91[c]	0.81	1.09	0.79	0.34[d]	0.12	0.36	0.08
sel39	0.81[c]	0.81	0.81	0.79	0.11[d]	0.11	0.10	0.07
sel40	1.66	1.16	1.65	**1.60**	0.81[d]	0.82	0.67	0.35
sel41	1.14[c]	1.13	1.31	0.91	0.48[d]	0.44	0.63	0.10
sel42	1.10[c]	1.22	1.31	0.87	1.81[d]	2.13	2.59	0.69
sel43	1.69	1.55	1.63	**1.52**	3.04	3.85	3.24	**1.65**
sel44	1.18[c]	1.17	1.19	1.17	0.18[d]	0.18	0.17	0.13
sel45	0.92[c]	0.92	1.12	0.82	0.42[d]	0.42	0.65	0.11
sel46	0.94[c]	0.96	0.94	0.88	0.43[d]	0.46	0.41	0.30
sel47	1.54	1.54	1.54	**1.37**	2.07	2.16	2.32	**1.81**
sel48	0.84[c]	0.84	0.93	0.84	0.30[d]	0.30	0.79	0.14
sel49	0.93[c]	0.89	0.93	0.87	0.33[d]	0.37	0.32	0.20
sel50	1.32[c]	1.33	1.33	1.16	0.59[d]	0.73	0.61	0.49
sel51	1.83	1.87	1.79	**1.63**	0.72[d]	0.75	0.77	0.66
sel52	1.40[c]	1.41	1.13	0.99	0.73[d]	0.74	0.69	0.49
sel17152	1.06[c]	0.94	1.00	0.87	0.93[d]	0.98	1.12	0.51

[a] They come from Table I of the main text

[b] These values, for the sake of comparison, are obtained after applying a detection algorithm which excludes the "outliers"; this algorithm is analogous to the one used by Ivanov et al., Nature (London) **399**, 461, 1999

[c] These individuals have $\min\{[\lambda_s(RR)]_l\}$ values which are equal to or smaller than the value $\lambda_s(\mathcal{M}) = 1.20 \pm 0.03$ discussed in the text.

[d] These individuals have $\min\{[\lambda_L(RR)]_l\}$ values which are equal to or smaller than the value $\lambda_L(\mathcal{M}) = 0.64 \pm 0.05$ discussed in the text.

[e] This individual has the smallest length (760 beats) among the H, which might be one of the reasons why this case only deviates from the other H.

follows:

Four individuals, i.e., two MIT (sel230 and sel231) and two EST (sele0612 and sele0704), have been identified as "outliers", because they exhibit $\nu_s(QRS)$ values which are *unusually* larger than unity. This can be justified if we consider the following two facts: (i) There is a *similarity* of the QRS morphology from heartbeat to heartbeat (e.g., see [8]), and (ii) the so called Long QT-syndrome,

TABLE II: The resulting values of the ratios $\lambda_s(RR)$ and $\lambda_L(RR)$ when using segments of length l=120 beats and then calculating their mean and minimum values.

signal	$\lambda_s(RR)$		$\lambda_L(RR)$	
	$\langle\lambda_s(RR)\rangle_l$	$\min\{[\lambda_s(RR)]_l\}$	$\langle\lambda_L(RR)\rangle_l$	$\min\{[\lambda_L(RR)]_l\}$
sel16265	1.70	1.46	1.87	0.98
sel16272	1.66	1.46	1.20	0.82
sel16273	1.59	1.47	1.95	0.79
sel16420	1.51	1.39	1.57	0.86
sel16483	1.42	1.23	2.45	0.90
sel16539	2.04	1.67	1.50	0.90
sel16773	1.91	1.67	2.41	0.77
sel16786	1.78	1.49	1.18	0.69
sel16795	1.77	1.68	0.68	0.44^c
sel17453	1.93	1.77	1.33	0.77
sel30	1.09	0.93	1.02	0.68
sel31	0.99	0.87	0.31	0.19
sel32	1.34	0.92	1.82	0.27
sel33	1.13	0.91	0.70	0.46
sel34	2.01	**1.39**	2.92	**1.26**
sel35	1.15	1.03	0.45	0.35
sel36	1.33	1.21	0.64	0.36
sel37	0.96	0.75	0.53	0.33
sel38	1.11	0.78	0.34	0.07
sel39	0.81	0.78	0.10	0.06
sel40	1.66	**1.58**	0.64	0.23
sel41	1.32	0.88	0.58	0.18
sel42	1.43	0.81	2.31	0.48
sel43	1.62	**1.42**	3.39	**1.11**
sel44	1.19	1.13	0.16	0.09
sel45	1.17	0.81	0.69	0.19
sel46	0.94	0.85	0.41	0.29
sel47	1.55	**1.34**	1.83	**1.28**
sel48	0.98	0.77	1.64	0.14
sel49	0.91	0.86	0.25	0.08
sel50	1.32	1.09	0.51	0.34
sel51	1.80	**1.60**	0.63	0.57
sel52	1.11	0.94	0.72	0.29
sel17152	0.99	0.79	1.16	0.40

which is characterized by prolongation of the QT-interval (representing the total duration of *both* the depolarization and the repolarization phases) preceding sudden cardiac death, is almost *solely* caused by lengthening of the repolarization phase (i.e., lengthening of the ST-interval) and *not* [9] of the QRS-. *Both* these facts reflect that, in all cases (even including SD), the quantity δS_{shuf}, when considering a few consecutive beats, should *not* greatly differ from δS as far as the QRS-interval is concerned. Actually, a first inspection of the Table I of the main text and the Tables III and IV shows that, in *all* groups of individuals, the ratio $\delta S_{shuf}/\delta S$ in the short range -i.e., $\nu_s(QRS)$- scatters more or less around unity. A closer inspection of these Tables reveals, however, that in four cases (among the 101 individuals) mentioned above, $\nu_s(QRS)$ greatly differs from unity (cf. A simple statistical test -by means of the STATIST[10]- of the 101 $\nu_s(QRS)$ values, immediately shows that these four cases can be considered as "outliers"). The origin of this difference might be attributed to an error in the automatic QRS detection as follows: The data were sampled at 250 Hz. The true error, however, of the R-peak determination by means of the automatic threshold detector [4–7] may be much larger[8] than the nominal sampling error (=1/250) due to the fact that the morphology of the QRS is significantly distorted in severely ill patients. Then the error may be as large as 30 msec [8].

The fifth individual identified as "outlier", i.e., sele0136, has a $\rho_L(QRS)$ value drastically larger than the corresponding values of *all* other patients. Moreover, sele0136 has been found to strongly deviate from the others as far as the ratio $\rho_L(QT)/\rho_L(QRS)$ is concerned; this ratio is unusually small (0.29), which is the *smallest* among the 101 individuals (cf. There are two

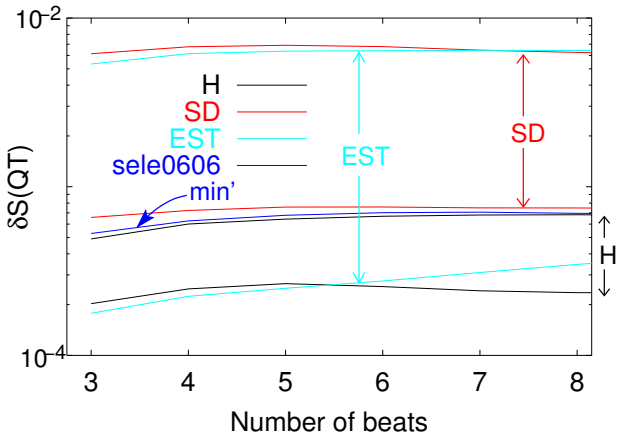

FIG. 3: (color) The δS-value of the QT-intervals versus the time-window lenght. Only, the (two) individuals who correspond to the maximum and the minimum δS-value, of each of the following three groups, are plotted: H (black), SD (red) and EST(blue). The curve labeled min' corresponds to the one that is called $\delta S(QT)_{min'}$ in the text (and refers here to sele0606).

more cases, i.e., sele0116 and sel820, which have a small ratio ≈ 0.39, while in *all* the others the value is larger than unity; the presence of these two cases, however, does not affect at all the final results). The influence of the omission of sele0136 on our conclusions, is not significant (compared to the four patients mentioned in the previous paragraph), as will be commented on later.

IV. ADDITIONAL COMMENTS ON THE PROCEDURE TO DISTINGUISH SD FROM ALL THE OTHERS, I.E., PATIENTS AND H

In Table I of the main text, the minima $min_H[\lambda_\kappa(\tau)]$, $min_H[\rho_\kappa(\tau)]$, $min_H[\nu_\kappa(\tau)]$ and maxima $max_H[\lambda_\kappa(\tau)]$, $max_H[\rho_\kappa(\tau)]$, $max_H[\nu_\kappa(\tau)]$ among the healthy individuals, are inserted, which are called, for the sake of convenience, H_{min} and H_{max}, respectively (and jointly named *H-limits*). To avoid confusion, the corresponding minima and maxima among the individuals of each group of patients and SD are labeled simply with *min* and *max*, respectively. For each of the latter limits, two values are given in each column. The upper is obtained upon considering all the patients of the relevant group, while the lower when omitting the corresponding "outliers" mentioned in the previous Section. For the reader's convenience, the limits found for all parameters in each group (without the "outliers"), are compiled in Table VIII (values without parenthesis). The superscripts "a" and "b", in the Table I of the main text and in the Tables III and IV, show the cases of SD and patients in which smaller and larger values than H_{min} and H_{max} have been found.

We start with the measures λ, ρ, ν. If we consider the three measures λ, ρ, ν (i.e., 16 parameters) altogether, we find (see Table IX) that twenty SD out of 24 (i.e., all SD except of the four: sel30, sel32, sel34 and sel37) violate some of the limits of *both* patients and H, thus allowing in principle a distinction of the vast majority of SD from the other individuals.

We now turn to the investigation of the $\delta S(QT)$ values. In Fig. 5 of the main text, the average δS(QT) value for each group is plotted versus the time-window length. The results of the four groups (MIT, MSV, MST, EST) of patients are located *between* H (the lowermost curve) and SD (the uppermost curve). If we plot, however, the curves for each one of the 101 individuals (in a way similar to that of Fig. 2(a) of the main text), we find, as mentioned in the main text, that there are some patients the results of which overlap with either SD or H. To exemplify the resulting main feature, and in order to avoid the overload of the figure with the curves of 101 individuals, we present Fig. 3, which shows *only* the limiting cases -i.e., the lowermost and the uppermost curve, called $\delta S(QT)_{min}$ and $\delta S(QT)_{max}$, respectively- obtained in the following three groups: SD (the two red curves), H (the two curves in black) and one group of patients only, i.e., EST (lines in blue). Two facts are apparent from the figure: First, the range between the two SD curves is separated from the corresponding range of H, as found in Fig.6 of Ref. [11] (and can be clearly visualized in Fig.2(a) of the main text). Second, the range between the two limiting EST curves overlaps significantly (i.e., 22 out of 33 EST) with the range between the two SD curves and to a lesser extent with that between the two H ones. Concerning the other three groups of patients, (*not* shown in Fig. 3), we just note that the former overlap occurs in *all* of them, while the latter one occurs for a few individuals only. It is the former overlap, of course, which obscures a clear distinction between SD and patients by means of a direct application of the $\delta S(QT)$ values alone.

We return to Fig. 3. In order to distinguish SD from patients, we must appropriately discriminate the overlap which refers to those of the EST individuals that lie above the uppermost $\delta S(QT)$ curve of H; this is called $\delta S(QT)_{max,H}$. Thus, the limits of the EST individuals we are currently interested in, do *not* extend from $\delta S(QT)_{min}$ to $\delta S(QT)_{max}$, since they must exceed $\delta S(QT)_{max,H}$, i.e., obey the relation (1) of the main text.

To visualize it, we also plot in Fig. 3, the curve which corresponds to the one of the EST individuals, i.e., sele0606, that has $\delta S(QT)$ value lying just above the $\delta S(QT)_{max,H}$. The latter EST individual (marked solely with min' in Fig. 3) corresponds to the value labeled $\delta S(QT)_{min'}$. In other words, if we apply the condition (2) of the main text to each group of patients, we are left only with those of the patients that actually overlap with SD. This assumes, of course, that a reasonable population for each group has been studied in advance, thus allowing a reliable determination of the corresponding limits.

We now compare the quantities λ, ρ, ν, $\delta S(QT)$ altogether, of each SD, to the corresponding parameters

of *only* those among the patients that happen to have $\delta S(QT)$ values exceeding the corresponding values of H, i.e., obey the condition (1) of the main text, or preferably the more accurate condition (2) of the maib text. These new limits of the latter patients are put in parenthesis in Table VIII (whenever they differ from the former limits). Such a comparison reveals that some of the 17 parameters of λ, ρ, ν, $\delta S(QT)$ (marked in Table X), in *all* SD, lie outside the limits of these patients (cf. the same happens, of course, if we compare each SD to the limits of H). The results are summarized in Table IX and point to the conclusion that *all* 24 SD are clearly distinguished from the patients (and H).The same conclusion is drawn if we consider instead, the 17 parameters λ,λ_{shuf}, ρ, δS (QT), see Tables XI and XII.

We now comment on three points. First, by using 18 parameters, instead of 16, for the λ, ρ, ν (i.e., using the two additional ρ values that compare the QRS- to QT-intervals, see Section II of the main text), this does not improve, as expected, the results (see Table XIII). Second, even when non-omitting the five "outliers", the above mentioned combined use of the measures λ, ρ, ν with either the condition (2) of the main text, or the approximate condition (1) of the main text, enables the distinction of the majority of SD, i.e., 18 out of 24 ($\approx 75\%$), or 17 out of 24 ($\approx$ 70%), respectively, see Table XIII. (cf. the non-omission of sel0136, changes the results only slightly, i.e., only sel42 out of the 24 SD is then misinterpreted as belonging to EST). Third, when using the RR and the QRS *only* (i.e., 10, instead of 17, parameters), and hence not considering the QT-interval at all, we find (see Table IX) that half of the SD (12 out of 24) can be distinguished. The importance of this finding lies in the fact that, when using an automatic threshold detector [4, 12], the RR- and QRS-intervals can be allocated more accurately than the QT-.

By summarizing, we can state that the combination of the three measures λ, ρ, ν with the condition (2) of the main text, seems to achieve the distinction of *all* SD from the patients. (If in this combination the approximate condition (1) of the main text is used instead, we obtain slightly different results e.g., compare the first two lines in Table IX). The same conclusion is drawn if we alternatively combine the three measures λ,λ_{shuf},ρ with the condition (2) of the main text. We emphasize, however, that the study of the estimation errors (see the Appendix of the main text) reveals that the confidence level for the distinction of *all* SD from the patients becomes appreciably larger if we combine *all* the measures λ, λ_{shuf}, ρ, ρ_{shuf}, ν (of *all* intervals) with the condition (2) of the main text applied to *both* δS(QT) and δS_{shuf}(QT), (i.e., in reality, we then consider the limits of those patients whom *both* δS(QT)- and δS_{shuf}(QT)-values are larger than those in H.

V. ADDITIONAL COMMENTS ON THE DISTINCTION BETWEEN PATIENTS AND H

Recalling the first fact mentioned in Section III of the main text, the desired distinction can be made by identifying as patients the individuals whom one or more of the parameters associated with λ, ρ, ν (of RR, QRS, QT) and/or $\delta S(QT)$ violate the *H-limits* (provided, of course, that the distinction of the SD has been *preceded*). Furthermore, comparing each of the Tables III and IV to (the H in) Table I of the main text, we also find that in *all* patients, at least one of their four λ parameters associated with RR and QRS, i.e., $\lambda_s(RR)$, $\lambda_L(RR)$, $\lambda_s(QRS)$ and $\lambda_L(QRS)$, violates one of the corresponding *H-limits*, thus allowing again a distinction between patients and H (cf. this does not hold for sele0136 only, who however is an "outlier", see Section III). A further inspection reveals that, among the limits of these four λ parameters, the most of patients violate the ones of $\lambda_s(RR)$ and/or $\lambda_L(RR)$.

Thus, in a future population consisting of all three categories SD, patients and H, in order to separate the last two ones, we may work as follows: We take as granted that (i) the limits determined from the patients and H of the population investigated here are precise enough to be used in the future populations as well, and (ii) we first apply the procedure to identify the SD (as summarized in III of the main text) among the other individuals that exist in the future population. It seems then that, in the latter population, the λ parameters of the RR and QRS can efficiently distinguish patients from H (cf. this can be further strengthened by the additional use of the corresponding ν parameters, which differentiate the most of patients -but *not* all of them- from the H). In other words, any (explicit) information on the QT may not be prerequisite for such a distinction. This is consistent with the clinical observations that the prolongation of the QT (due to the lengthening of the ST-interval) is mainly a characteristic of the SD.

VI. ADDITIONAL COMMENTS ON THE COMPLEMENTARITY OF THE COMPLEXITY MEASURES

The complementarity of the procedures for the distinction of the (otherwise healthy) SD from H, i.e., *if* the population under investigation does *not* include patients, has been discussed in Section II of the main text.

Here we examine the complementarity of the four quantities λ, ρ, ν and $\delta S(QT)$ on differentiating *all* SD from the others (i.e., patients and H). This can be judged from a further inspection of Table IX, which also contains the results, for all possible combinations, upon considering only *three* of these quantities. For example, the combination λ, ρ, ν cannot differentiate four SD (i.e., sel30, sel32, sel34, sel37) from the patients. As a second example, the combination ρ, ν and $\delta S(QT)$ cannot identify

three SD (i.e., sel33, sel45, sel46), who are *different* from the four ones that could *not* be discriminated by the former combination λ, ρ, ν. By the same token, we find that each of the remaining combinations fails to identify certain SD, who can be distinguished by another combination(s). Therefore, we conclude that each of the four quantities λ, ρ, ν, $\delta S(QT)$ seems to complement the others in identifying *all* SD (cf. the same conclusion is drawn if we alternatively use the four quantities λ, λ_{shuf}, ρ and δS(QT), see Table XIII). This might be understood in the context that each of these quantities, as already mentioned, presumably captures certain "elements" of heart dynamics only. As for the necessity of using all these quantities, it might stem from the following fact. The database we used, consists of SD individuals in which different physiological processes might have led to sudden cardiac death (cf. the selection of such a *heterogeneous* database was intentionally made, because it was our aim to find, if possible, a general procedure to identify SD). If a study of "homogeneous" SD databases(in the sense that the same physiological processes preceded the sudden cardiac death) is made, it may happen that a smaller number of parameters are necessary to distinguish *all* SD. Until the completion of such studies, however, it is recommended to use *all* the parameters associated with the aforementioned quantities, as described in the Appendix of the main text.

VII. SES ACTIVITIES AND AN. THEIR FEATURES COMPARED TO ECG

We finally discuss whether the complexity measures in the SES activities and AN exhibit some features that allow their classification. First, we recall[13] that, in view of their (dichotomous) nature, the (relative) measure ρ has *no* meaning here. The other measures λ,λ_{shuf}, ν are tabulated (see Table XIV) for each signal along with the S-values. These measures have been calculated *only* in the short range ($\kappa = s$), because the length N, for reasons explained in Ref.[13], does *not* allow a reliable calculation in the longer range. An inspection of Table XIV, reveals that the λ_s-values of AN (except of n1) are somewhat larger than those in the SES activities, thus allowing, only a *marginal* distinction between these two types of signals, as mentioned in Ref.[13]. Thus, the following interesting feature emerges: Among the four systems SES, AN, SD, H, that are *all* characterized by scaling (complex) dynamics, the two ones of *critical* dynamics (i.e., SD and SES activities) exhibit as a *common* behavior that their λ_s-values approach that of the *Markovian* case (i.e., their complex dynamics becomes more "simplified"), $\lambda_s(\mathcal{M}) = 1.20 \pm 0.03$, while in the others (H and AN) do *not*. This different behavior is more distinct when comparing SD to H and becomes only *marginal* between SES activities and AN. When studying the S-values themselves, however, the following is noticed: most SES activities can be clearly distinguished[15] from the majority of AN (i.e., except of n5), because they have S-values smaller and larger, respectively, than the value S_u=0.0966 of the "uniform" distribution (as the latter was defined in Refs. [14, 15]); on the other hand, when dealing with ECG they *all* have S-values comparable, more or less, to S_u (for example, see the values for the SD and H given in Table XV), thus not allowing a clear distinction among their principal categories. Recalling that *all* the systems under consideration are *non*-Markovian ([11, 14, 15]), the following fact (the origin of which, however, has not yet been clearly understood) seems to hold in general: when two systems of different dynamics have S-values that *distinctly* differ from S_u, they can be distinguished on the basis of the S-values alone; on the other hand, if their S-values are close to S_u, their distinction requires the inspection of the complexity measures relevant to their δS-values.

VIII. ADDITIONAL COMMENTS DOR THE DISTINCTION BETWEEN SD AND H ON THE BASIS OF δS(QT)

The distinction between SD and H on the basis of δS(QT) as depicted in Fig.2 of the main text and discussed in Ref.8 of the main text cannot be attributed to the large experimental error in the allocation of the QT for the following reason: Jané et al.[5] evaluated the automatic threshold based detector (which is a single-lead detector presented in Refs.[6] and [7]) of waveforms limits in Holter ECG with the QT database. They concluded that for the end of T-wave over 71% of records had a well performed automatic wave boundaries detection. For all MST and H records no detection errors were found. On the other hand, in SD and MSV, mainly due to low "signal to noise ratio" (SNR) or small T amplitude, poor detection results were found (cf. Table 7 of Ref.[5] classifies 11 out of 24 SD in the category of "well detected signals", i.e., the correctness and the precision of the detector's performance, quantified by a mean error and a standard deviation of this error, were smaller than 40 and 50 ms, respectively). We emphasize that the findings of Ref.8 of the main text (and hence of Fig.2 of the main text) result in a unified picture in *all* SD, and hence it could *not* be associated with the measurement error -which, of course, affects the computations- especially in certain SD with "poor detection results". Jané et al.[5] recommended that, since the error probability of using this single lead detector is higher when the SNR of T wave decreases, this problem can be reduced by selecting the lead which the doctor considers more appropriate to measure QT. Thus, following this recommendation, one of the two leads (available in the QT database) was appropriately selected, for each record, in our study. To sum up, the above mentioned Holter-recordings were annotated with the values of the QT-intervals obtained from the automatic detector after taking appropriate care to reduce the error probability.

[1] P. C. Ivanov, M. G. Rosenblum, C.-K. Peng, J. Mietus, S. Havlin, H. E. Stanley, and A. L. Goldberger, Nature **399**, 461 (1999).
[2] D. Kaplan and P. Staffin, Computer codes `Software for Heart Rate Variability` available from `http://www.macalester.edu/~kaplan/hrv/doc/` (2004).
[3] D. K. Lake, J. R. Moorman, and C. Hanqing, Computer code `sampen` available from `http://www.physionet.org/physiotools/sampen/` (2004).
[4] P. Laguna, R. G. Mark, A. Goldberger, and G. B. Moody, in *Computers in Cardiology* (IEEE Computer Society Press, Piscataway, NJ, 1997), vol. 24, p. 673.
[5] R. Jané, A. Blasi, J. J. Garcia, and P. Laguna, in *Computers in Cardiology* (IEEE Computer Society Press, Piscataway, NJ, 1997), vol. 24, p. 295.
[6] P. Laguna, N. V. Thakor, P. Caminal, R. Jané, and H. R. Yoon, Medical & Biological Engineering & Computing **28**, 67 (1990).
[7] P. Laguna, R. Jané, and P. Caminal, Computers and Biomedical Research **27**, 45 (1994).
[8] J. J. Zebrowski and R. Baranowski, Phys. Rev. E **67**, 056216 (2003).
[9] I. A. Khan, Am. Heart J. **143**, 7 (2002).
[10] D. Melcher, Computer code STATIST available from `http://www.usf.uos.de/~breiter/tools/statist/index.en.html` (2001).
[11] P. A. Varotsos, N. V. Sarlis, E. S. Skordas, and M. S. Lazaridou, Phys. Rev. E, to be published **EHJ904** (2004).
[12] K. Tateno and L. Glass, Med. Biol. Eng. Comput. **39**, 664 (2001).
[13] P. A. Varotsos, N. V. Sarlis, E. S. Skordas, and M. S. Lazaridou, Practica of Athens Academy **78**, 151 (2003).
[14] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Phys. Rev. E **67**, 021109 (2003).
[15] P. A. Varotsos, N. V. Sarlis, and E. S. Skordas, Phys. Rev. E **68**, 031106 (2003).

TABLE III: The variability measures (λ), the relative ones (ρ), and the ratios $\nu \equiv \overline{\delta S}_{shuf}/\overline{\delta S}$ in the short (s) range and in the longer (L) range in EST (sele0104 to sele0704) and MST (sel301 to sel 310) along with their $\overline{\delta S}_{3-4}(QT)$-values.

individual	RR		QRS		QT		RR over QRS		RR over QT		3-4 beats (ν_s)			50-70 beats (ν_L)			
	$\lambda_s(RR)$	$\lambda_L(RR)$	$\lambda_s(QRS)$	$\lambda_L(QRS)$	$\lambda_s(QT)$	$\lambda_L(QT)$	$\rho_s(QRS)$	$\rho_L(QRS)$	$\rho_s(QT)$	$\rho_L(QT)$	RR	QRS	QT	RR	QRS	QT	$\overline{\delta S}_{3-4}(QT)\times 10^3$
sele0104	0.99[a]	0.80[a]	1.23	0.51	1.27	0.43[a]	1.27	2.01	1.12	2.10	1.19	0.93	1.35	0.76	1.04	1.75[b]	1.54[b]
sele0106	1.18[a]	2.46	1.23	0.49	1.10[a]	0.94	0.45	2.28	1.34	3.49	2.28[b]	0.92	1.59[b]	0.49	1.09	0.88	0.42
sele0107	1.45	2.67	1.15[a]	0.42[a]	1.27	0.72	0.34	2.18	0.32[a]	1.21[a]	2.40	0.96	1.08	0.47	1.25[b]	0.99	1.83[b]
sele0110	1.84	2.82[b]	1.23	0.83[b]	1.23	0.66	0.46	1.56	0.81	3.45	2.57[b]	1.05	0.96	0.57	0.83[a]	0.97	0.89[b]
sele0111	1.67	6.66[b]	1.16	0.56	1.09[a]	0.66	0.09[a]	1.13	0.51[a]	5.12	3.72[b]	1.00	1.08	0.31[a]	1.00	0.87	0.71[b]
sele0112	1.42[a]	2.74[b]	1.22	0.71[b]	1.31	1.00	0.74	2.86	2.87	7.86	2.03	1.07	1.26	0.43[a]	0.87[a]	0.70	0.33
sele0114	1.45	0.83[a]	1.12[a]	0.56	1.36	1.73[b]	1.39	2.08	4.63	2.22	1.24	1.18[b]	1.82[b]	0.88[b]	1.11	0.59[a]	0.90[b]
sele0116	0.94[a]	0.84[a]	0.99[a]	0.50	1.19	1.67[b]	1.54	2.61	2.03	1.03[a]	1.25	1.07	1.58[b]	0.68	1.10	0.50[a]	5.75[b]
sele0121	1.54	1.92	1.42[b]	1.63[b]	1.71[b]	1.91[b]	0.34	0.40	1.35	1.36[a]	2.16	1.25[b]	2.01[b]	0.65	0.69[a]	0.68	0.40
sele0122	1.55	4.69[b]	1.31[b]	0.82[b]	1.10[a]	1.25[b]	0.27	1.55	0.51[a]	1.94	4.42[b]	1.18[b]	1.56[b]	0.53	0.79[a]	0.58[a]	0.35
sele0124	1.32[a]	1.84	1.48[b]	0.56	1.22	0.65	0.20	0.67	0.70	1.97	1.86	0.97	1.04	0.51	1.08	0.84	0.80[b]
sele0126	1.12[a]	1.13	1.25	0.64[b]	1.14[a]	0.48[a]	0.09[a]	0.15[a]	0.43[a]	1.01[a]	1.35	0.97	1.01	0.67	0.97	1.07	0.85[b]
sele0129	1.39[a]	2.59	1.22	0.98[b]	1.22	1.03	0.99	2.64	3.54	8.93	2.79[b]	1.17[b]	1.61	0.61	0.67	0.82	0.33
sele0133	1.26[a]	1.22	1.20	0.82[b]	1.41	1.17[b]	0.82	1.22	5.07	5.29	1.68	1.17[b]	1.59[b]	0.60	0.76[a]	0.72	0.20[a]
sele0136	1.77	2.25	1.25	0.57	1.09[a]	1.04	1.92[b]	7.52[b]	1.01	2.17	2.33[b]	1.08[b]	1.20	0.58	0.99	0.61[a]	1.29[b]
sele0166	1.86	5.07[b]	1.30[b]	0.86[b]	1.14[a]	0.69	0.21	1.22	0.58[a]	4.31	4.71[b]	1.19[b]	1.07	0.55	0.80[a]	0.84	0.81[b]
sele0170	1.54	3.07[b]	1.15[a]	0.71[b]	1.18	0.88	0.31	1.34	1.25	4.36	2.84[b]	1.07	1.36	0.54	0.90	0.79	0.37
sele0203	1.16[a]	0.95[a]	1.29	0.64[b]	1.24	1.06	0.45	0.68	0.56[a]	0.51[a]	1.10	1.02	1.12	0.69	0.98	0.64[a]	2.89[b]
sele0210	2.33[b]	3.00[b]	1.39[b]	0.74[b]	1.19	0.49[a]	0.12[a]	0.49	0.61[a]	3.76	2.46[b]	0.98	1.10	0.56	1.00	1.16[b]	0.79[b]
sele0211	1.20[a]	3.20[b]	1.29	0.67[b]	1.23	0.53	0.03[a]	0.13[a]	0.19[a]	1.18[a]	2.95[b]	1.00	1.01	0.48	1.03	1.06	0.64[b]
sele0303	0.95[a]	0.73[a]	1.17	0.54	1.15[a]	0.48	0.67	0.90	0.53[a]	0.80[a]	1.73	1.01	1.10	1.01[b]	1.02	1.19[b]	1.13[b]
sele0405	2.08[b]	5.60[b]	1.24	0.65[b]	1.19	0.73	0.14[a]	1.21	0.50[a]	3.82	3.54[b]	1.04	1.13	0.41	0.89	0.80	0.91[b]
sele0406	1.50	2.61	1.11[a]	0.72[b]	1.11[a]	0.66	0.29	1.06	0.94	3.75	2.34[b]	1.03	1.12	0.53	0.80[a]	0.88	0.56
sele0409	1.25[a]	3.21[b]	1.38[b]	0.80[b]	1.17	0.56	0.04[a]	0.15[a]	0.15[a]	0.84[a]	11.11[b]	1.04	1.41	1.90[b]	1.01	1.28[b]	1.44[b]
sele0411	0.99[a]	0.61[a]	1.26	0.60	1.25	0.72	0.76	0.78	3.37	2.86	1.01[a]	0.98	1.12	0.88[b]	1.15	0.87	1.03[b]
sele0509	0.79[a]	0.48[a]	1.24	0.85[b]	1.54[b]	1.16[b]	0.91	0.52	10.04[b]	4.19	1.09[a]	1.01	1.63	0.91[b]	0.84[a]	0.79	0.38
sele0603	1.66	2.85[b]	1.14[a]	0.89[b]	1.58[b]	2.82[b]	0.71	2.29	3.35	3.38	2.41[b]	1.16[b]	3.04[b]	0.50	0.71[a]	0.61[a]	0.27
sele0604	1.70	3.37[b]	1.34[b]	0.88[b]	1.34	1.01	0.07[a]	0.26[a]	0.33[a]	1.11[a]	3.61[b]	1.08[b]	1.24	0.63	0.83[a]	0.72	1.57[b]
sele0606	1.17[a]	1.41	1.18	0.90[b]	1.28	0.73	0.64	1.00	1.73	3.31	2.29[b]	1.08[b]	1.32	0.82[b]	0.78[a]	0.98	0.58[b]
sele0607	1.09[a]	2.41	1.15[a]	0.69[b]	1.03[a]	1.00	0.32	1.11	0.99	2.38	2.60[b]	1.08[b]	1.22	0.52	0.85[a]	0.59[a]	0.50
sele0609	1.00[a]	1.57	1.38[b]	0.86[b]	1.23	0.82	0.71	1.29	1.15	2.21	1.66	1.11[b]	1.11	0.53	0.87[a]	0.74	1.05[b]
sele0612	1.60	5.76[b]	1.25	2.29[b]	1.12[a]	1.63[b]	0.08[a]	0.21[a]	0.23[a]	0.83[a]	3.91[b]	1.47[l]	1.28	0.40[a]	0.38[a]	0.47[a]	1.12[b]
sele0704	0.97[a]	1.95	1.33[b]	1.26[b]	1.30	1.50[b]	0.60	0.92	0.98	1.28[a]	2.40[b]	2.06[b]	1.48[b]	0.67	0.89	0.57[a]	1.21[b]
min[c]	0.79	0.48	0.99	0.42	1.03	0.43	0.03	0.13	0.15	0.51	1.01	0.92	0.96	0.31	0.38	0.47	0.20
	0.79	0.48	0.99	0.42	1.03	0.43	0.03	0.13	0.15	0.51	1.01	0.92	0.96	0.31	0.67	0.50	0.20
max[c]	2.33	6.66	1.48	2.29	1.71	2.82	1.92	7.52	10.04	8.93	11.11	2.06	3.04	1.90	1.25	1.75	5.75
	2.33	6.66	1.48	1.63	1.71	2.82	1.54	2.86	10.04	8.93	11.11	1.25	3.04	1.90	1.25	1.75	5.75
sel301	1.01[a]	1.39	1.20	0.58	1.38	1.36[b]	0.52	1.25	1.09	1.11[a]	8.45[b]	1.17[b]	4.14[b]	3.13[b]	1.04	1.82[b]	0.75[b]
sel302	1.42[a]	2.68[b]	1.22	0.63[b]	1.19	0.69	0.20	0.86	0.53[a]	2.07	9.18[b]	0.95	2.82[b]	1.93[b]	0.98	2.16[b]	0.66[b]
sel306	1.72	3.75[b]	1.29	0.68[b]	1.28	1.43[b]	0.37	2.04	2.43	6.38	2.82[b]	1.04	1.53[b]	0.44	0.89	0.59	0.29
sel307	1.54	1.90	1.30[b]	0.71[b]	1.18	1.09	0.99	2.62	4.98	8.70	1.76	1.10[b]	1.36	0.53	0.83[a]	0.66	0.22[a]
sel308	1.01[a]	0.45[a]	1.28	0.70[b]	1.18	0.67	0.96	0.61	1.97	1.32[a]	2.30[b]	1.01	1.17	2.53[b]	0.97	0.95	1.33[b]
sel310	1.38[a]	2.17	1.28	0.70[b]	1.28	0.84	0.17[a]	0.51	0.57[a]	1.47[a]	11.65[b]	1.16[b]	3.57[b]	2.93[b]	1.02	2.22[b]	0.63[b]
min	1.01	0.45	1.20	0.58	1.18	0.67	0.17	0.51	0.53	1.11	1.76	0.95	1.17	0.44	0.83	0.59	0.22
max	1.72	3.75	1.30	0.71	1.38	1.43	0.99	2.62	4.98	8.70	11.65	1.17	4.14	3.13	1.04	2.22	1.33

[a]These values are smaller than the H_{min} which corresponds to each column

[b]These values are larger than the H_{max} which corresponds to each column

[c]Two values are given in each column: The upper is obtained when considering all the patients, while the lower when omitting sele0136, sele0612 and sele0704 (see the text)

TABLE IV: The variability measures (λ), the relative ones (ρ), and the ratios $\nu \equiv \overline{\delta S}_{shuf}/\overline{\delta S}$ in the short (s) range and in the longer (L) range in MIT (sel100 to sel233) and MSV (sel803 to sel891) along with their $\overline{\delta S}_{3-4}(QT)$-values.

individual	RR		QRS		QT		RR over QRS		RR over QT		3-4 beats (ν_s)			50-70 beats (ν_L)			
	$\lambda_s(RR)$	$\lambda_L(RR)$	$\lambda_s(QRS)$	$\lambda_L(QRS)$	$\lambda_s(QT)$	$\lambda_L(QT)$	$\rho_s(QRS)$	$\rho_L(QRS)$	$\rho_s(QT)$	$\rho_L(QT)$	RR	QRS	QT	RR	QRS	QT	$\overline{\delta S}_{3-4}(QT) \times 10^3$
sel100	1.13	0.68[a]	1.39[b]	0.62[b]	1.04[a]	0.33[a]	0.57	0.62	0.45[a]	0.91[a]	1.08[a]	1.09[b]	0.98	0.81[b]	1.00	1.38	3.39[b]
sel102	1.35[a]	0.49[a]	1.25	0.63[b]	1.62[b]	0.96	1.10	0.85	1.71	0.88[a]	1.06[a]	1.08[b]	1.20	0.97[b]	0.86[a]	0.74	0.90[b]
sel103	1.96	1.74	1.31[b]	0.63[b]	1.77[b]	0.55	0.21	0.58	0.86	2.70	1.64	1.07	1.17	0.59	0.92	1.35[b]	0.80[b]
sel104	1.26[a]	0.31[a]	1.63[b]	0.46[a]	1.10[a]	0.44[a]	0.48	0.33[a]	0.67	0.48[a]	0.98[a]	1.23[b]	1.03	1.66[b]	1.30[b]	0.91	3.71[b]
sel114	0.98[a]	0.38[a]	1.26	0.63[b]	1.24	0.46[a]	1.08	0.65	2.07	1.69[a]	0.99[a]	0.98	0.95	1.24[l]	1.10	1.17[b]	2.00[b]
sel116	0.95[a]	0.24[a]	1.35[b]	0.71[b]	1.39	0.61	0.88	0.29[a]	4.20	1.62[a]	0.94[a]	0.94	1.06	1.80[b]	0.96	0.97	0.95[b]
sel117	0.80[a]	0.75[a]	1.07[a]	0.53	1.11[a]	0.52	0.29	0.42	1.09	1.58[a]	1.30	0.99	1.03	0.68	0.93	0.99	0.79[b]
sel123	1.40[a]	1.29	1.16	0.52	1.21	0.59	0.68	1.67	1.92	4.20	1.43	0.95	1.05	0.68	1.04	0.99	0.92[b]
sel213	1.01[a]	0.17[a]	1.17	0.63[b]	1.15[a]	0.46[a]	0.33	0.09[a]	1.69	0.62[a]	0.93[a]	1.05	0.98	2.48[b]	1.11	1.09[b]	0.80[b]
sel221	1.08[a]	0.37[a]	1.47[b]	0.50	1.19	0.53	0.82	0.61	3.40	2.36	0.96[a]	0.92	1.05	1.33[b]	1.38[b]	0.98	2.18[b]
sel223	0.82[a]	0.26[a]	0.99[a]	0.61	0.99	0.41[a]	1.33	0.56	2.04	1.28[a]	0.98[a]	1.10[b]	0.97	1.43[b]	0.87[a]	1.06	2.68[b]
sel230	1.86	3.17[b]	1.54[b]	1.75[b]	1.39	1.18[b]	0.22	0.39[a]	0.60[a]	1.62[a]	3.40[b]	1.57[b]	1.36	0.61	0.57[a]	0.66	1.17[b]
sel231	1.32[a]	3.19[b]	1.24	2.24[b]	1.21	2.80[b]	0.60	0.86	1.02	1.16[a]	3.87[b]	2.71[b]	2.71[b]	0.74	0.58[a]	0.59[a]	1.78[b]
sel232	1.57	0.95[a]	1.19	0.56	1.19	0.51	2.04[b]	3.45	5.96[b]	11.03[b]	1.09[a]	0.98	1.03	1.13[b]	0.92	1.05	1.50[b]
sel233	0.92[a]	0.18[a]	1.24	0.50	1.22	0.68	0.76	0.27[a]	2.67	0.71[a]	0.86[a]	0.95	0.99	2.23[b]	1.15	0.84	2.71[b]
min[c]	0.80	0.17	0.99	0.46	0.99	0.33	0.21	0.09	0.45	0.48	0.86	0.92	0.95	0.59	0.57	0.59	0.79
	0.80	0.17	0.99	0.46	0.99	0.33	0.21	0.09	0.45	0.48	0.86	0.92	0.95	0.59	0.86	0.74	0.79
max[c]	1.96	3.19	1.63	2.24	1.77	2.80	2.04	3.45	5.96	11.03	3.87	2.71	2.71	2.48	1.38	1.38	3.71
	1.96	1.74	1.63	0.71	1.77	0.96	2.04	3.45	5.96	11.03	1.64	1.23	1.20	2.48	1.38	1.38	3.71
sel803	0.92[a]	0.55[a]	1.36[b]	0.61	1.30	0.70	0.89	0.80	6.70[b]	5.35	0.94[a]	0.97	1.09	0.83[b]	1.25[b]	0.87	0.65[b]
sel808	0.99[a]	1.87	1.19	1.06[b]	1.32	0.64	0.41	0.72	1.41	4.11	1.94	1.18[b]	1.25	0.51	0.76[a]	1.16[b]	0.63[b]
sel811	1.09[a]	0.64[a]	1.20	0.47[a]	1.16	0.53	0.79	1.07	3.88	4.66	1.17	0.99	1.02	0.93[b]	1.12	1.00	0.45
sel820	0.96[a]	0.17[a]	1.22	0.67[b]	1.14[b]	0.53	2.81	0.73	0.87	0.29[a]	0.91[a]	0.95	1.00	2.30[b]	0.99	0.99	4.60[b]
sel821	1.05[a]	0.16[a]	1.36[b]	0.63[b]	1.16	0.50	1.50	0.38[a]	3.38	1.09[a]	0.84[a]	1.06	0.97	2.75[b]	1.09	1.03	1.17[b]
sel840	1.22[a]	1.51	1.23	0.61	1.16	0.74	0.52	1.29	1.87	3.84	1.62	1.02	1.58[b]	0.58	0.97	1.14[b]	0.61[b]
sel847	0.85[a]	0.32[a]	1.12[a]	0.53	1.16	0.56	0.93	0.56	6.76[b]	3.82	0.95[a]	1.03	1.23	1.21[b]	1.05	1.31[b]	0.61[b]
sel853	0.92[a]	0.18[a]	1.27	0.72[b]	1.24	0.56	1.56	0.38[a]	2.87	0.91[a]	0.91[a]	0.97	1.06	2.31[b]	0.97	0.97	1.24[b]
sel871	0.95[a]	1.27	1.27	0.69[b]	1.20	0.74	1.01	1.85	1.87	3.18	1.52	1.09[b]	1.19	0.61	0.90	0.76	1.12[b]
sel872	0.97[a]	0.55[a]	1.32[b]	0.58	1.24	0.53	0.91	0.86	4.63	4.78	0.97[a]	1.00	1.06	0.82[b]	1.18[b]	1.07	0.63[b]
sel873	1.02[a]	0.90[a]	1.20	0.54	1.26	0.53	0.24	0.40	1.04	1.78[a]	1.14	0.99	1.03	0.65	0.99	1.03	0.89[b]
sel883	0.98[a]	0.36[a]	1.09[a]	0.47[a]	1.18	0.60	0.70	0.54	2.78	1.68[a]	0.99[a]	0.98	1.12	1.22[b]	1.03	0.89	0.96[b]
sel891	0.92[a]	0.23[a]	1.16	0.56	1.10[a]	0.56	2.02[b]	0.82	3.74	1.52[a]	0.89[a]	1.01	1.02	1.85[b]	0.96	0.91	1.17[b]
min	0.85	0.16	1.09	0.47	1.10	0.50	0.24	0.38	0.87	0.29	0.84	0.95	0.97	0.51	0.76	0.76	0.45
max	1.22	1.87	1.36	1.06	1.32	0.74	2.81	1.85	6.76	5.35	1.94	1.18	1.58	2.75	1.25	1.31	4.60

[a]These values are smaller than the H_{min} which corresponds to each column

[b]These values are larger than the H_{max} which corresponds to each column

[c]Two values are given in each column: The upper is obtained when considering all the patients, while the lower when omitting sel230 and sel231 (see the text)

TABLE V: The measures λ_{shuf} and ρ_{shuf} in the short (s) range and in the longer (L) range in EST (sele0104 to sele0704) and MST (sel301 to sel 310) along with the $\overline{\delta S}_{3-4,shuf}(QT)$-values.

individual	RR		QRS		QT		RR over QRS		RR over QT		
	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\overline{\delta S}_{3-4,shuf}(QT)\times 10^3$
sele0104	1.12	0.57	1.37	0.55	1.21	0.55	1.44	1.50	1.21[a]	0.85[a]	2.08[b]
sele0106	1.13	0.51	1.21	0.56	1.28	0.57	1.10	1.00	3.18	1.92	0.66
sele0107	1.13	0.53	1.27	0.51	1.25	0.67	0.84	0.87	0.79[a]	0.58[a]	1.98[b]
sele0110	1.24	0.54	1.30	0.70	1.56[b]	0.70	1.27	0.98	2.29	1.84	0.85[b]
sele0111	1.06	0.47[a]	1.24	0.55	1.19	0.53	0.40	0.35	2.12	1.80	0.78[b]
sele0112	1.21	0.58[b]	1.33	0.58	1.15	0.55	1.32	1.31	5.64	4.56	0.42
sele0114	1.13	0.51	1.22	0.54	1.16	0.52	1.78	1.67	6.71	3.26	1.63[b]
sele0116	1.23	0.53	1.19	0.54	1.18	0.55	1.71	1.67	2.22	1.34	9.07[b]
sele0121	1.13	0.53	1.47[b]	0.96[b]	1.32	0.63	0.64	0.35	3.17	1.22[a]	0.80[b]
sele0122	1.20	0.52	1.10	0.55	1.34[b]	0.55	1.03	0.98	2.43	1.64	0.54
sele0124	1.03[a]	0.46[a]	1.26	0.59	1.29	0.53	0.39	0.30	1.43	1.21[a]	0.83[b]
sele0126	1.17	0.50	1.21	0.61	1.15	0.51	0.13[a]	0.10[a]	0.64[a]	0.63[a]	0.86[b]
sele0129	1.15	0.56	1.17	0.55	1.25	0.54	2.47	2.52	10.50[b]	6.81	0.53
sele0133	1.14	0.43[a]	1.13	0.51	1.16	0.50	1.11	0.95	8.72	4.37	0.32
sele0136	1.09	0.48	1.15	0.50	1.18	0.54	4.78[b]	4.54[b]	2.73	2.07	1.55[b]
sele0166	1.16	0.48	1.25	0.55	1.26	0.55	0.95	0.83	3.23	2.72	0.87[b]
sele0170	1.24	0.53	1.31	0.63	1.16	0.51	0.94	0.79	3.99	3.06	0.50
sele0203	1.19	0.58[b]	1.23	0.58	1.23	0.60	0.48	0.48	0.63[a]	0.56[a]	3.25[b]
sele0210	1.24	0.55	1.43	0.77[b]	1.10[a]	0.49	0.38[a]	0.28[a]	1.88	1.91	0.87[b]
sele0211	1.15	0.51	1.36	0.70	1.30	0.56	0.08[a]	0.06[a]	0.57[a]	0.54[a]	0.65
sele0303	1.00[a]	0.48	1.17	0.55	1.19	0.53	1.04	0.90	0.86[a]	0.74[a]	1.24[b]
sele0405	1.24	0.56	1.11	0.54	1.18	0.52	0.54	0.57	2.07	2.02	1.03[b]
sele0406	1.26	0.56	1.15	0.55	1.18	0.54	0.72	0.74	2.41	2.26	0.63
sele0409	1.17	0.54	1.27	0.75[b]	1.12	0.52	0.41	0.29[a]	1.70	1.24[a]	2.03[b]
sele0411	1.21	0.56	1.36	0.68	1.24	0.55	0.74	0.60	3.27	2.94	1.15[b]
sele0509	1.01[a]	0.45[a]	1.25	0.69	1.19	0.53	0.88	0.57	10.01[b]	4.87	0.62
sele0603	1.17	0.57	1.27	0.59	1.30	0.60	1.75	1.66	8.73	2.79	0.84[b]
sele0604	1.18	0.53	1.28	0.70	1.20	0.55	0.26[a]	0.20[a]	1.33	0.99[a]	1.95[b]
sele0606	1.18	0.54	1.27	0.67	1.27	0.56	1.27	1.02	3.65	2.63	0.76[b]
sele0607	1.20	0.50	1.15	0.52	1.15	0.54	0.70	0.68	2.45	2.01	0.61
sele0609	1.26	0.55	1.19	0.68	1.23	0.52	0.99	0.80	1.74	1.65	1.16[b]
sele0612	1.29[b]	0.54	1.25	0.56	1.33[b]	0.58	0.23[a]	0.22[a]	1.00[a]	0.72[a]	1.44[b]
sele0704	1.25	0.54	1.19	0.54	1.39[b]	0.60	0.67	0.66	2.35	1.44	1.79[b]
min[c]	1.00	0.43	1.10	0.50	1.10	0.49	0.08	0.06	0.57	0.54	0.32
	1.00	0.43	1.10	0.51	1.10	0.49	0.08	0.06	0.57	0.54	0.32
max[c]	1.29	0.58	1.47	0.96	1.56	0.70	4.78	4.54	10.50	6.81	9.07
	1.26	0.58	1.47	0.96	1.56	0.70	2.47	2.52	10.50	6.81	9.07
sel301	1.21	0.56	1.10	0.51	1.24	0.57	3.34[b]	3.66[b]	8.54	1.96	3.12[b]
sel302	1.20	0.51	1.31	0.66	1.17	0.52	2.14	1.65	5.25	1.80	1.85[b]
sel306	1.18	0.50	1.22	0.55	1.28	0.53	1.07	0.97	7.64	4.63	0.44
sel307	1.11	0.52	1.17	0.50	1.18	0.54	1.68	1.77	9.95[b]	7.03	0.31
sel308	1.16	0.51	1.43	0.69	1.22	0.52	2.08	1.54	4.31	3.62	1.57[b]
sel310	1.17	0.52	1.31	0.62	1.19	0.53	1.75	1.48	6.88	1.87	2.27[b]
min	1.11	0.50	1.10	0.50	1.17	0.52	1.07	0.97	4.31	1.80	0.31
max	1.21	0.56	1.43	0.69	1.28	0.57	3.34	3.66	9.95	7.03	3.12

[a]These values are smaller than the H_{min} which corresponds to each column

[b]These values are larger than the H_{max} which corresponds to each column

[c]Two values are given in each column: The upper is obtained when considering all the patients, while the lower when omitting sele0136, sele0612 and sele0704 (see the text)

TABLE VI: The measures λ_{shuf} and ρ_{shuf} in the short (s) range and in the longer (L) range in MIT (sel100 to sel233) and MSV (sel803 to sel 891) along with the $\overline{\delta S}_{3-4,shuf}(QT)$-values.

individual	RR		QRS		QT		RR over QRS		RR over QT		
	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\overline{\delta S}_{3-4,shuf}(QT) \times 10^3$
sel100	1.25	0.51	1.15	0.55	1.21	0.47[a]	0.52	0.48	0.46[a]	0.56[a]	3.31[b]
sel102	1.04	0.37[a]	1.16	0.51	1.13	0.49	1.28	0.94	2.16	1.19[a]	1.09[b]
sel103	1.15	0.49	1.16	0.51	1.22	0.53	0.38[a]	0.36	1.71	1.19[a]	0.94[b]
sel104	1.20	0.56	1.15	0.47	0.89[a]	0.37[a]	0.34[a]	0.40	0.65[a]	0.92[a]	3.84[b]
sel114	1.08	0.46[a]	1.32	0.71	1.24	0.55	1.16	0.76	2.10	1.89	1.89[b]
sel116	1.07	0.48	1.46[b]	0.75[b]	1.08[a]	0.50	0.85	0.54	3.73	3.02	1.01[b]
sel117	0.92[a]	0.44[a]	1.14	0.50	1.16	0.54	0.38[a]	0.33	1.34	1.08[a]	0.81[b]
sel123	1.17	0.61[b]	1.26	0.57	1.06[a]	0.54	1.11	1.19	2.99	3.31	0.96[b]
sel213	1.14	0.48	1.37	0.70	1.20	0.53	0.29[a]	0.20[a]	1.46	1.39	0.79[b]
sel221	1.16	0.55	1.33	0.73	1.09[a]	0.48[a]	0.77	0.59	3.09	3.26	2.30[b]
sel223	1.18	0.50	1.25	0.59	1.14	0.53	1.05	0.90	1.47	1.71	2.59[b]
sel230	1.08	0.47[a]	1.29	0.59	1.16	0.54	0.52	0.42	2.42	1.46	1.60[b]
sel231	1.23	0.57	1.14	0.47	1.25	0.54	0.85	1.03	4.02	1.47	4.83[b]
sel232	1.34[b]	0.92[b]	1.13	0.51	1.16	0.47[a]	2.35	4.22[b]	7.01	13.04[b]	1.55[b]
sel233	1.24	0.55	1.30	0.65	1.26	0.57	0.64	0.54	2.01	1.90	2.69[b]
min[c]	0.92	0.37	1.13	0.47	0.89	0.37	0.29	0.20	0.46	0.56	0.79
	0.92	0.37	1.13	0.47	0.89	0.37	0.29	0.20	0.46	0.56	0.79
max[c]	1.34	0.92	1.46	0.75	1.26	0.57	2.35	4.22	7.01	13.04	4.83
	1.34	0.92	1.46	0.75	1.26	0.57	2.35	4.22	7.01	13.04	3.84
sel803	1.13	0.51	1.37	0.80[b]	1.16	0.54	0.86	0.54	6.13	5.07	0.70[b]
sel808	1.18	0.53	1.24	0.67	0.85[a]	0.48[a]	0.65	0.51	2.66	1.99	0.79[b]
sel811	0.96[a]	0.48	1.18	0.52	1.22	0.52	0.91	0.83	4.66	4.17	0.46
sel820	1.19	0.45[a]	1.29	0.69	1.17	0.55	2.54	1.64	0.75[a]	0.62[a]	4.57[b]
sel821	1.16	0.51	1.28	0.65	1.14	0.54	1.15	0.90	2.84	2.81	1.13[b]
sel840	1.16	0.53	1.32	0.60	1.23	0.56	0.90	0.79	3.16	1.97	0.96[b]
sel847	1.09	0.48	1.15	0.54	1.10[a]	0.60	0.75	0.67	5.47	3.28	0.75[b]
sel853	1.05	0.51	1.24	0.73	0.99[a]	0.48[a]	1.35	0.93	2.42	2.28	1.31[b]
sel871	1.22	0.54	1.27	0.54	1.06[a]	0.43[a]	1.26	1.27	2.58	2.67	1.33[b]
sel872	1.15	0.48	1.16	0.69	1.21	0.55	0.84	0.59	4.34	3.63	0.67[b]
sel873	1.24	0.52	1.20	0.52	1.22	0.49	0.27[a]	0.27[a]	1.15[a]	1.16[a]	0.92[b]
sel883	1.22	0.50	1.17	0.49	1.10[a]	0.47[a]	0.65	0.66	2.50	2.37	1.08[b]
sel891	1.15	0.53	1.16	0.52	1.22	0.51	1.60	1.62	3.08	3.36	1.19[b]
min	0.96	0.45	1.15	0.49	0.85	0.43	0.27	0.27	0.75	0.62	0.46
max	1.24	0.54	1.37	0.80	1.23	0.60	2.54	1.64	6.13	5.07	4.57

[a]These values are smaller than the H_{min} which corresponds to each column

[b]These values are larger than the H_{max} which corresponds to each column

[c]Two values are given in each column: The upper is obtained when considering all the patients, while the lower when omitting sel230 and sel231 (see the text)

TABLE VII: The measures λ_{shuf} and ρ_{shuf} in the short (s) range and in the longer (L) range in H (sel16265 to sel17453) and SD (sel30 to sel17152) along with the $\overline{\delta S}_{3-4,shuf}(QT)$-values. The values of λ_{shuf} do not coincide with those given in Ref.[5] for the reasons discussed in the Appendix of the main text.

individual	RR		QRS		QT		RR over QRS		RR over QT		
	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\lambda_{s,shuf}$	$\lambda_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\rho_{s,shuf}$	$\rho_{L,shuf}$	$\overline{\delta S}_{3-4,shuf}(QT) \times 10^3$
sel16265	1.09	0.51	1.17	0.51	1.12	0.49	1.94	1.92	5.45	4.19	0.49
sel16272	1.27	0.57	1.44	0.73	1.32	0.57	0.39	0.30	1.25	1.34	0.45
sel16273	1.19	0.53	1.16	0.52	1.16	0.53	2.87	2.90	8.19	5.36	0.36
sel16420	1.04	0.48	1.19	0.54	1.17	0.52	1.87	1.64	3.85	3.08	0.39
sel16483	1.24	0.55	1.29	0.58	1.15	0.53	0.59	0.56	2.20	1.89	0.41
sel16539	1.21	0.55	1.19	0.52	1.16	0.54	3.02	3.21	9.63	7.30	0.66
sel16773	1.17	0.51	1.10	0.46	1.22	0.70	1.90	2.09	3.31	2.35	0.50
sel16786	1.16	0.55	1.14	0.50	1.16	0.52	1.82	1.97	6.49	5.53	0.27
sel16795	1.19	0.57	1.21	0.54	1.17	0.53	0.97	1.03	3.72	3.73	0.58
sel17453	1.18	0.52	1.14	0.51	1.24	0.56	2.57	2.62	5.23	4.74	0.35
H_{min}	1.04	0.48	1.10	0.46	1.12	0.49	0.39	0.30	1.25	1.34	0.27
H_{max}	1.27	0.57	1.44	0.73	1.32	0.70	3.02	3.21	9.63	7.30	0.66
sel30	1.22	0.57	1.40	0.76^b	1.20	0.53	0.54	0.41	1.78	1.74	1.18^b
sel31	1.16	0.53	1.43	0.89^b	1.00^a	0.43^a	0.91	0.54	0.65^a	0.63^a	3.46^b
sel32	1.43^b	0.60^b	1.19	0.59	1.11^a	0.53	0.24^a	0.24^a	0.71^a	0.69^a	1.29^b
sel33	1.25	0.63^b	1.16	0.49	1.14	0.51	0.95	1.20	2.55	2.96	0.82^b
sel34	1.18	0.51	1.32	0.91^b	1.14	0.50	0.98	0.55	2.93	2.73	0.77^b
sel35	1.20	0.55	1.13	0.70	1.21	0.50	1.74	1.38	0.82^a	0.93^a	6.26^b
sel36	1.21	0.57	1.13	0.47	1.00^a	0.46^a	2.35	2.82	1.52	1.60	2.25^b
sel37	0.98^a	0.41^a	1.13	0.53	1.14	0.47^a	0.60	0.46	1.19^a	1.00^a	3.54^b
sel38	0.94^a	0.44^a	1.20	0.53	1.17	0.52	0.58	0.48	0.36^a	0.30^a	3.03^b
sel39	1.15	0.51	1.35	0.73	1.15	0.50	0.60	0.41	1.04^a	1.01^a	2.41^b
sel40	1.09	0.49	1.22	0.51	1.18	0.61	0.15^a	0.14^a	0.26^a	0.22^a	3.21^b
sel41	1.67^b	0.69^b	1.27	0.55	1.09^a	0.51	0.16^a	0.20^a	0.59^a	0.76^a	1.62^b
sel42	1.06	0.51	1.12	0.51	1.13	0.50	1.41	1.42	2.55	1.98	1.19^b
sel43	1.28^b	0.54	1.17	0.52	1.19	0.55	0.16^a	0.17^a	0.34^a	0.31^a	2.40^b
sel44	1.20	0.52	1.25	0.66	1.17	0.51	0.51	0.40	0.88^a	1.01^a	3.69^b
sel45	1.10	0.47^a	1.50^b	0.67	1.03^a	0.39^a	1.43	1.01	1.04^a	1.07^a	1.90^b
sel46	1.08	0.45^a	1.27	0.63	1.29	0.56	1.39	0.99	1.49	1.23^a	3.49^b
sel47	1.00^a	0.50	1.13	0.53	1.28	0.60	0.32^a	0.29^a	0.26^a	0.22^a	2.78^b
sel48	1.16	0.51	1.14	0.56	1.34^b	0.51	0.62	0.56	1.18^a	0.84^a	2.48^b
sel49	1.19	0.48	1.15	0.55	1.32	0.60	0.92	0.80	0.85^a	0.76^a	3.79^b
sel50	1.26	0.52	1.15	0.58	1.43^b	0.73^b	1.83	1.67	1.28	1.10^a	4.75^b
sel51	1.17	0.52	1.23	0.48	1.19	0.51	0.22^a	0.24^a	0.44^a	0.44^a	1.83^b
sel52	0.89^a	0.44^a	1.29	0.63	1.18	0.58	0.20^a	0.14^a	0.71^a	0.45^a	1.94^b
sel17152	1.25	0.55	1.20	0.55	1.16	0.52	0.10^a	0.10^a	0.38^a	0.40^a	1.18^b
min	0.89	0.41	1.12	0.47	1.00	0.39	0.10	0.10	0.26	0.22	0.77
max	1.67	0.69	1.50	0.91	1.43	0.73	2.35	2.82	2.93	2.96	6.26

[a]These values are smaller than the H_{min} given in each column
[b]These values are larger than the H_{max} given in each column

TABLE VIII: Compilation of the limits of each of the complexity measures λ, ρ,λ_{shuf}, ρ_{shuf}, ν along with those of $\overline{\delta S}_{3-4}(QT)$ and $\overline{\delta S}_{3-4,shuf}(QT)$ in healthy humans (H) and in four groups (MIT, MSV, EST, MST) of heart disease patients. In parenthesis we put the limits which change when considering only the patients who have $\overline{\delta S}_{3-4}(QT)$ values larger than those in H. The percentage errors of the various parameters investigated are also shown. For the sake of brevity, the subscript "sh" stands for "shuf".

parameter	H		MIT		MSV		EST		MST		$\epsilon_m(\%)$
	min	max	min	max	min	max	min	max	min	max	
$\lambda_s(RR)$	1.43	2.00	0.80	1.96	0.85	1.22	0.79(0.94)	2.33	1.01	1.72(1.42)	11.66
$\lambda_L(RR)$	0.99	2.69	0.17	1.74	0.16	1.87	0.48(0.61)	6.66	0.45	3.75(2.68)	14.62
$\lambda_s(QRS)$	1.16	1.29	0.99	1.63	1.09	1.36	0.99	1.48	1.20	1.30(1.28)	10.53
$\lambda_L(QRS)$	0.48	0.61	0.46	0.71	0.47	1.06	0.42	1.63(0.90)	0.58	0.71(0.70)	11.19
$\lambda_s(QT)$	1.16	1.41	0.99	1.77	1.10	1.32	1.03(1.09)	1.71(1.36)	1.18	1.38	32.92
$\lambda_L(QT)$	0.50	1.11	0.33	0.96	0.50	0.74	0.43	2.82(1.73)	0.67	1.43(1.36)	41.37
$\rho_s(QRS)$	0.18	1.85	0.21	2.04	0.24	2.81	0.03	1.54	0.17	0.99(0.96)	18.23
$\rho_L(QRS)$	0.40	7.10	0.09	3.45	0.38	1.85	0.13	2.86(2.61)	0.51	2.62(1.25)	18.93
$\rho_s(QT)$	0.67	5.57	0.45	5.96	0.87	6.76	0.15	10.04(4.63)	0.53	4.98(1.97)	53.56
$\rho_L(QT)$	1.79	10.04	0.48	11.03	0.29	5.35	0.51	8.93(5.12)	1.11	8.70(2.07)	50.92
$\nu_s(RR)^a$	1.10	2.27	0.86	1.64	0.84	1.94	1.01	11.11	1.76(2.30)	11.65	13.47
$\nu_L(RR)^a$	0.44	0.77	0.59	2.48	0.51	2.75	0.31	1.90	0.44(1.93)	3.13	12.73
$\nu_s(QRS)^a$	0.88	1.07	0.92	1.23	0.95	1.18	0.92(0.93)	1.25(1.19)	0.95	1.17	10.97
$\nu_L(QRS)^a$	0.88	1.15	0.86	1.38	0.76	1.25	0.67(0.78)	1.25	0.83(0.97)	1.04	11.33
$\nu_s(QT)^a$	0.91	1.46	0.95	1.20	0.97	1.58	0.96	3.04(1.82)	1.17	4.14	36.96
$\nu_L(QT)^a$	0.65	1.07	0.74	1.38	0.76	1.31	0.50	1.75	0.59(0.95)	2.22	37.33
$\overline{\delta S}_{3-4}(QT) \times 10^3$	0.23	0.56	0.79	3.71	0.45(0.61)	4.59	0.20(0.56)	5.75	0.22(0.63)	1.33	28.51
$\lambda_{s,sh}(RR)$	1.04	1.27	0.92	1.34	0.96(1.05)	1.24	1.00	1.26	1.11(1.16)	1.21	11.00
$\lambda_{L,sh}(RR)$	0.48	0.57	0.37	0.92	0.45	0.54	0.43(0.46)	0.58	0.50(0.51)	0.56	10.86
$\lambda_{s,sh}(QRS)$	1.10	1.44	1.13	1.46	1.15	1.37	1.10(1.11)	1.47(1.43)	1.10	1.43	11.34
$\lambda_{L,sh}(QRS)$	0.46	0.73	0.47	0.75	0.49	0.80	0.51	0.96(0.77)	0.50(0.51)	0.69	12.27
$\lambda_{s,sh}(QT)$	1.12	1.32	0.89	1.26	0.85	1.23	1.10	1.56	1.17	1.28(1.24)	32.46
$\lambda_{L,sh}(QT)$	0.49	0.70	0.37	0.57	0.43	0.60	0.49	0.70	0.52	0.57	35.29
$\rho_{s,sh}(QRS)$	0.39	3.02	0.29	2.35	0.27	2.54	0.08	2.47(1.78)	1.07(1.75)	3.34	17.71
$\rho_{L,sh}(QRS)$	0.30	3.21	0.20	4.22	0.27	1.64	0.06	2.52(1.67)	0.97(1.48)	3.66	18.29
$\rho_{s,sh}(QT)$	1.25	9.63	0.46	7.01	0.75	6.13	0.57	10.50(6.71)	4.31	9.95(8.54)	53.11
$\rho_{L,sh}(QT)$	1.34	7.30	0.56	13.04	0.62	5.07	0.54	6.81(3.26)	1.80	7.03(3.62)	50.69
$\overline{\delta S}_{3-4,sh}(QT) \times 10^3$	0.27	0.66	0.79	3.84	0.46(0.67)	4.57	0.32(0.63)	9.07	0.31(1.57)	3.12	28.50

[a]The values of these quantities do not fully coincide with those given in Ref.[11] for the reasons discussed in the Appendix

TABLE IX: Results of the distinction of 24 SD among 101 individuals upon using the measures λ, ρ, ν along with $\overline{\delta S}_{3-4}(QT)$ (only four ρ-parameters at the most, i.e., $\rho_s(QRS)$, $\rho_L(QRS)$, $\rho_s(QT)$, $\rho_L(QT)$, are used).

Measures combined[a]	The non-differentiated SD[b]	Number of SD distinguished
λ, ρ, ν and relation(2)	**None**	24 **(all)**
λ, ρ, ν and relation(1)	**One:** sel35(MIT)	23
λ, ρ, ν	**Four:** sel30(EST), sel32(EST), sel34(EST), sel37(EST)	20
λ, ρ and relation(2)	**Four:** sel30(MSV), sel41(MIT) sel46(MIT), sel49(MSV)	20
ρ, ν and relation(2)	**Three:** sel33(MSV,EST), sel45(MIT,MSV), sel46(MSV,EST)	21
λ, ν and relation(2)	**Seven:** sel36(MIT,EST), sel38(MIT) sel41(MSV), sel42(EST), sel47(EST), sel51(EST), sel17152(MSV,EST)	17
λ, ρ, ν of RR and QRS only	**Twelve:** sel30(EST), sel32(EST), sel34(EST) sel35(MIT,MSV), sel37(EST), sel38(MIT), sel40(EST), sel43(EST) sel45(MSV), sel47(EST), sel50(MIT), sel51(EST)	12

[a]In all cases the data of the five patients sel230, sel231, sele0612, sele0704, sele0136 have been excluded (see the text)

[b]In parenthesis we mark the group(s) of patients in which the corresponding SD is mislocated

TABLE X: The precise limits of λ, ρ, ν and $\overline{\delta S}_{3-4}$(QT) which are violated by each of the 24 sudden cardiac death individuals.

individual	$\lambda_s(RR)$	$\lambda_L(RR)$	$\lambda_s(QRS)$	$\lambda_L(QRS)$	$\lambda_s(QT)$	$\lambda_L(QT)$	$\rho_s(QRS)$	$\rho_L(QRS)$	$\rho_s(QT)$	$\rho_L(QT)$	$\nu_s(RR)$	$\nu_L(RR)$	$\nu_s(QRS)$	$\nu_L(QRS)$	$\nu_s(QT)$	$\nu_L(QT)$	$\overline{\delta S}_{3-4}(QT)$
sel30	a	a		abce		c		c		c	c	c	a	abcde	c	a	a
sel31	ac	ace	acd	abc		d	c	c	d	abce	ace	ac			c	abcd	ac
sel32	ac	a		abce	c	c	d	acd	ad	ac	c	ac	a	abcde	c	c	a
sel33	a	a	abcde	c		c			c	c	ac	ac		abc	c		ab
sel34	cd	abcd	ac	abcde	ac	d				c	bcd	abcd	a	abce	c	bcd	ab
sel35	a	ae		a	ac	acd	ce	c	d	ac	ac	ac		c	c		abcde
sel36	ad	a	ac	c		c	abce	cde		a	ac	ac			c	c	ac
sel37	ace	a		abc	ac	d				ac	c	bc	a	abcde	c	abcd	ac
sel38	ace	ace		a	acde	c		acd	abcd	abcde	c	ac	a	c	c		ac
sel39	acde	abcde		abc	c	c		acde		abcde	ace	abde		c	c	c	ac
sel40	cd	a	ac	c		acd	abcd	acd	abcd	abce	ac	ac		c	bcde	a	ac
sel41	a	ae	c	a		c	d	acd	d	ac	ace	ac		abc	c		ac
sel42	a	b	c	c		bd		cde		c	c	abcd	a	c	b	bcd	a
sel43	cd	abcd		abc			abcd	acd	abcde	ace	abd	bc	a	abce	c	c	ac
sel44	a	ace	acde	abcd	acde	acde		acd		ac	ace	ae	cde	abcde	abcde	ad	abc
sel45	ace	ace	c	abc	de		c			ac	ace	ac		c	c	c	ac
sel46	ac	ace	acd	ac	ac	c	c			a	ac	ac		abc	c		ac
sel47	cd	bd	c	c	d	c	abcd		abcde	ace	c	bcd		c	c		ac
sel48	acde	ace		abcde	ac	bd		acd		abce	abce	ac	abcde	abcde	b	cd	ac
sel49	ace	ace	c	abc	c	c	c	c		ac	ace	ac	a	abcde	cd	a	abc
sel50	ad	ae		acd		abcde	ce	cd		c	ac	ac		ac	bcde	abd	abcd
sel51	cd	a	ac	abcd		c	abcd	acd	abcd	abce	c	ac		ac	c	c	ac
sel52	ad	a	ac	abce		bd	abcd	acde	abcd	abce	c	ac	a	abcde		bcd	ac
sel17152	a	a	ac		ac	c	abcd	acde	abcd	abce	bc	ac			c		a

Where a, b, c, d, e denote the cases where the limits of H, MIT, MST, MSV, EST are violated, respectively.

TABLE XI: The precise limits which are violated by each one of the 24 SD, when using the complexity measures λ, λ_{shuf}, ρ and $\overline{\delta S}_{3-4}(QT)$ to distinguish the SD from the other individuals. For the sake of brevity, the subscript "sh" stands for "shuf".

individual	λ_s	λ_L	λ_s	λ_L	λ_s	λ_L	$\lambda_{s,sh}$	$\lambda_{L,sh}$	$\lambda_{s,sh}$	$\lambda_{L,sh}$	$\lambda_{s,sh}$	$\lambda_{L,sh}$	ρ_s	ρ_L	ρ_s	ρ_L	$\delta S_{3-4}(QT)$
sel30	a	a		abce		c	c	cd	d	abc				c		c	a
sel31	ac	ace	acd	abc		d			d	abcde	ace	ace	c	c	d	abce	ac
sel32	ac	a		abce	c	c	abcde	acde			ac		d	acd	ad	ac	a
sel33	a	a	abcde	c		c	cd	acde		ce	c	c			c	c	ab
sel34	cd	abcd	ac	abcde	ac	d				abcde	c	c				c	ab
sel35	a	ae		a	ac	acd		d	d	c		c	ce	c	d	ac	abcde
sel36	ad	a	ac	c		c		cd	d	cde	ace	ace	abce	cde		a	ac
sel37	ace	a		abc	ac	d	acde	acde	d		c	ace				ac	ac
sel38	ace	ace		a	acde	c	acde	acde						acd	abcd	abcde	ac
sel39	acde	abcde		abc	c	c	c			c	c	c		acde		abcde	ac
sel40	cd	a	ac	c		acd	c	c				bcd	abcd	acd	abcd	abce	ac
sel41	a	ae	c	a		c	abcde	acde			ace	c	d	acd	d	ac	ac
sel42	a	b	c	c		bd	c		bd		c	c		cde		c	a
sel43	cd	abcd		abc			acde						abcd	acd	abcde	ace	ac
sel44	a	ace	acde	abcd	acde	acde						c		acd		ac	abc
sel45	ace	ace	c	abc	de		c	ac	abcde		ace	acde	c			ac	ac
sel46	ac	ace	acd	ac	ac	c	c	ace			bcd		c			a	ac
sel47	cd	bd	c	c	d	c	acd	c	d		bcd	bc	abcd		abcde	ace	ac
sel48	acde	ace		abcde	ac	bd			d		abcd	c		acd		abce	ac
sel49	ace	ace	c	abc	c	c		c			bcd	bc	c	c		ac	abc
sel50	ad	ae		acd		abcde	cd				abcd	abcde	ce	cd		c	abcd
sel51	cd	a	ac	abcd		c				cde		c	abcd	acd	abcd	abce	ac
sel52	ad	a	ac	abce		bd	abcde	acde				bc	abcd	acde	abcd	abce	ac
sel17152	a	a	ac		ac	c	cd	d			c		abcd	acde	abcd	abce	a

Where a, b, c, d, e denote the cases where the limits of H, MIT, MST, MSV, EST are violated, respectively.

TABLE XII: Results of the distinction of 24 SD among 101 individuals upon using λ_{shuf}, $\overline{\delta S}_{3-4}$(QT) and four ρ-parameters at the most, i.e., $\rho_s(QRS)$, $\rho_L(QRS)$, $\rho_s(QT)$, $\rho_L(QT)$.

Measures combined[a]	The non-differentiated SD[b]	Number of SD distinguished
$\lambda, \rho, \lambda_{shuf}$ and relation(2)	**None**	24 **(all)**
$\lambda, \rho, \lambda_{shuf}$ and relation(1)	**One:** sel35(MIT)	23
$\lambda, \rho, \lambda_{shuf}$	**Two:** sel30(EST), sel34(EST),	22
λ, ρ and relation(2)	**Four:** sel30(MSV), sel41(MIT) sel46(MIT), sel49(MSV)	20
ρ, λ_{shuf} and relation(2)	**Four:** sel30(EST), sel37(MIT), sel44(EST), sel49(EST)	20
λ, λ_{shuf} and relation(2)	**Six:** sel36(MIT), sel38(MIT) sel40(EST), sel42(EST), sel47(EST), sel17152(MIT,EST)	18
λ, ρ, λ_{shuf} of RR and QRS only	**Nine:** sel30(EST), sel34(EST), sel35(MIT) sel38(MIT), sel40(EST), sel46(MIT), sel47(EST), sel49(MSV), sel50(MIT)	15

[a]In all cases the data of the five patients sel230, sel231, sele0612, sele0704, sele0136 have been excluded (see the text)
[b]In parenthesis we mark the group(s) of patients in which the corresponding SD is mislocated

TABLE XIII: Results of the distinction of 24 SD among 101 individuals upon using $\lambda, \nu, \overline{\delta S}_{3-4}$(QT) and six ρ-parameters at the most, i.e., including also $\rho_s(QRS)$ / $\rho_s(QT)$ and $\rho_L(QRS)$ / $\rho_L(QT)$

Measures combined	The non-differentiated SD[c]	Number of SD distinguished
λ, ρ, ν and relation(1)[a]	**None**	24 **(all)**
λ, ρ and relation(1)[a]	**Four:** sel30(MSV), sel41(MIT) sel46(MIT), sel49(MSV)	20
ρ, ν and relation(1)[a]	**Three:** sel33(MSV,EST), sel45(MSV), sel46(MSV,EST)	21
λ, ν and relation(1)[a]	**Eight:** sel35(MIT), sel36(MIT,EST), sel38(MIT) sel41(MSV), sel42(EST), sel47(EST), sel51(EST), sel17152(MSV,EST)	16
λ, ρ, ν and relation(1)[b]	**Seven:** sel30(MIT, EST),sel32(MIT, EST), sel34(EST), sel41 (MIT), sel42(EST),sel46(MIT), sel49(MIT)	17
λ, ρ, ν and relation(2)[b]	**Six:** sel30(MIT, EST),sel32(MIT, EST), sel34(EST), sel41 (MIT), sel42(EST),sel46(MIT)	18
λ, ρ, ν[b]	**Eight:** sel30(MIT,EST),sel32(MIT, EST), sel34(EST), sel37(EST), sel41 (MIT), sel42(EST), sel46(MIT),sel49(MIT)	16

[a]Excluding from the data the five patients sel230, sel231, sele0612, sele0704, sele0136 (see the text)
[b]Without excluding the patients mentioned in "a".
[c]In parenthesis, we mark the group (s) of patients in which the corresponding SD is mislocated.

TABLE XIV: The complexity measures of SES activities and AN along with their S-values (as the latter were reported in Ref.[15]).

signal	λ_s	$\lambda_{s,shuf}$	ν	S
K1	1.26	1.27	1.21	0.067±0.003
K2	1.26	1.29	1.30	0.081±0.003
U	1.06	1.24	1.17	0.092[a]±0.004
A	0.97	1.14	0.97	0.070±0.008
n1	1.25	1.23	1.21	0.143±0.003
n2	1.30	1.31	1.18	0.103±0.003
n3	1.35	1.26	1.24	0.117±0.010
n4	1.36	1.26	1.20	0.106±0.010
n5	1.32	1.28	1.12	0.091[a]±0.011
n6	1.36	1.01	1.15	0.102±0.007

[a]Note that in these two cases the S-values are comparable to S_u, and hence their distinction can be made on the basis of the λ_s-values (see the text), which differ markedly.

TABLE XV: The entropies $S(\tau)$ in natural time for SD and H. Note that they are more or less comparable to S_u(=0.0966), see the main text.

individual	S(RR)	S(QRS)	S(QT)
sel16265	0.0972	0.0965	0.0965
sel16272	0.0969	0.0961	0.0963
sel16273	0.0958	0.0964	0.0961
sel16420	0.0959	0.0963	0.0963
sel16483	0.0971	0.0976	0.0968
sel16539	0.0957	0.0966	0.0967
sel16773	0.0963	0.0963	0.0961
sel16786	0.0978	0.0964	0.0966
sel16795	0.0953	0.0966	0.0962
sel17453	0.0962	0.0966	0.0964
sel30	0.0954	0.0959	0.0960
sel31	0.0962	0.0966	0.0958
sel32	0.0962	0.0985	0.0961
sel33	0.0971	0.0967	0.0963
sel34	0.0963	0.0952	0.0963
sel35	0.0961	0.0964	0.0957
sel36	0.0958	0.0966	0.0956
sel37	0.0963	0.1002	0.0960
sel38	0.0959	0.0964	0.1000
sel39	0.0962	0.0950	0.0960
sel40	0.0959	0.1005	0.0966
sel41	0.0960	0.1003	0.0969
sel42	0.0963	0.0970	0.0968
sel43	0.0957	0.0955	0.0974
sel44	0.0963	0.0964	0.0970
sel45	0.0963	0.0976	0.0951
sel46	0.0931	0.0966	0.0933
sel47	0.0967	0.0966	0.0975
sel48	0.0988	0.0965	0.0919
sel49	0.0969	0.0965	0.0970
sel50	0.0959	0.0961	0.0935
sel51	0.0962	0.0967	0.0958
sel52	0.0957	0.0928	0.0948
sel17152	0.0974	0.0972	0.0957