

# Time Course of the Occurrences of Acute Cardiovascular Events in the Italian City of Brindisi

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Ecological and analytical studies on mortality and morbidity in Brindisi, a southern Italian city at high risk of environment crisis, reported significant excesses concerning all and specific causes of death. Focusing on cardiac pathology, we investigated the time course of the daily occurrences of acute cardiovascular events (OCE) leading to unscheduled hospitalization of subjects resident in Brindisi, during years 2001-2008. Methods. OCE series was analyzed by Detrended Fluctuation Analysis (DFA). DFA is a tool of analysis suitable to quantify the correlation properties of a process by computing a scaling exponent  $\alpha$ ,  $0 < \alpha \leq 1.5$ . To destroy the temporal structure of the data, DFA was repeated over a set of thousand realizations of randomly shuffled OCE; the 95th percentile of the distribution of their  $\alpha$  exponents ( $\alpha_{95}$ ) was computed for evaluating the hypothesis of detecting a random behavior of OCE. Results. DFA of OCE showed two scaling regions with a crossover at  $n = 30$  days, with  $\alpha_1 = 0.52$  and  $\alpha_2 = 0.74$ , below and above  $n$  respectively. The shuffling produced a unique scaling with  $\alpha_{95} = 0.54$ . These results indicate lack of short-term correlation and presence of long-term positive correlation among original data, and uncorrelation of the surrogates. Conclusions. Four aspects can be pointed out: 1) Randomness could be what one expects: no link exists among events, they occur randomly; 2) OCE is not a completely random series; 3) What about positive correlation? As reported in a recent case crossover study in which the association between OCE and air pollution in Brindisi was analyzed, air pollutants concentrations can play a role: increase/decrease of OCE following persistent high/low levels of air pollution; 4) The two OCE scaling regions can be the effect of different time courses related to subjects gender and age: hence the necessity of an analysis by separate categories. All the above hypotheses are currently under investigation.