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EDITORIAL

The rhythmic oscillation of life

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Each morning we wake up, we have breakfast and then begin our activities. Usually we eat more times a day at scheduled times and then we are ready again for another night of sleep.
This is the circadian rhythm whose name comes from the Latin *circa diem (about the day)* as it takes a 24-hour day period.
It undergoes a variety of physiological functions, among them: the sleep-wake cycle, body temperature, the secretion of hormones, cerebral activity and eating patterns.
The science studying the rhythmic oscillation of life is called chronobiology. It has begun a few decades ago and it has provided important publications allowing the knowledge on human physiology to advance. It is nonetheless still unknown and viewed as something exotic by most part of the medical care professionals and operators. Years ago a medical doctor called me to ask information about melatonin. After I had described the hormone and its functions, he then asked me if melatonin should be administered twice a day, once in the morning and once in the evening, as one would do with antibiotics. This reveals a lot about the knowledge of chronoendocrinology of the above-mentioned health operator who is probably in good company.
Yet this knowledge is truly crucial as it has several implications in the clinical practice. The most known and by now proven is the drug resistant hypertension shown by the so called Nondipper patients namely individuals whose blood pressure does not decrease at night as the normal rhythm does. Control studies have proven that it is better to administer the same drug in the evening rather than in the morning, the shifted time intake of the same drug reduces the cardio-cerebrovascular risk[1].
Furthermore in the last 15 years chronobiology has shown that in addition to the central rhythm regulated by the suprachiasmatic nucleus (the master clock) in the hypothalamus, also all the main organs and biological devices have their own rhythm that gets synchronized to the master clock.
For example the pancreatic beta cells releasing insulin have their own intrinsic rhythm that influences the secretion of insulin, in addition to

the insulin coming from the blood glucose. This means that on equal amounts of blood glucose[2], the quantity of insulin produced by the pancreas depends also on the chronobiological state of the beta cells. During the morning the rhythm of beta cells is more active, thus insulin is effective in its work. During the afternoon and especially in the evening the rhythm is less adequate, therefore in the evening we will experience a higher level of plasma glycemia. This last data contradict the common opinion that it is better to consume carbohydrates during the evening. In his interview, George Chrousos reminds us that the role of brain and emotions on metabolism is now irrefutable. This has also been documented in a recent study that proves how the hypothalamus has a direct effect on insulin[3] production. The brain-pancreas axis has been long investigated and it has now become a reality to which the clinical practice will have to adapt.

1.Hermida RC, et al (2015) *Hypertens Res.* doi: 10.1038/hr.2015.142.
2. Dibner C, Schibler U (2015) Science 350;628-629
3. Stanley SA et al (2016) Nature 531(7596):647-50