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RYTHMS AND ECONOMY OF METABOLISM

In biological cells, changes in availability of free Ca^{2+} ions are the signaling medium to control a plethora of key processes within the cells themselves, influence their social life and when Ca^{2+} levels exceed physiological boundaries eventually kill them. The available toolkit of Ca^{2+} -dependent cellular apps is versatile and adapted to cover a wide range of spatial requirements at many different time scales. Insulin-secreting beta cells in pancreas use a subset of these apps to control the metabolic economy of an organism, distributing and constantly redistributing available nutrients absorbed from the digestive tract or released from different cellular sources by the means of blood plasma transport to supply energy, provide building material for housekeeping, check and fill the cellular energy stores. Collectives and network of collectives of hundreds of millions of beta cells get orchestrated to sense and respond to diverse stimuli and continuously adapt the rhythm and intensity of their activity to the current metabolic context. When these rhythms subside or go out of control, blood plasma gets either flooded or deprived of vital nutrients, both compromising survival.