

Potential health and well-being impacts of discontinuing seasonal changes of time



Darío Acuña-Castroviejo
University of Granada, Spain

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Structure of the Presentation

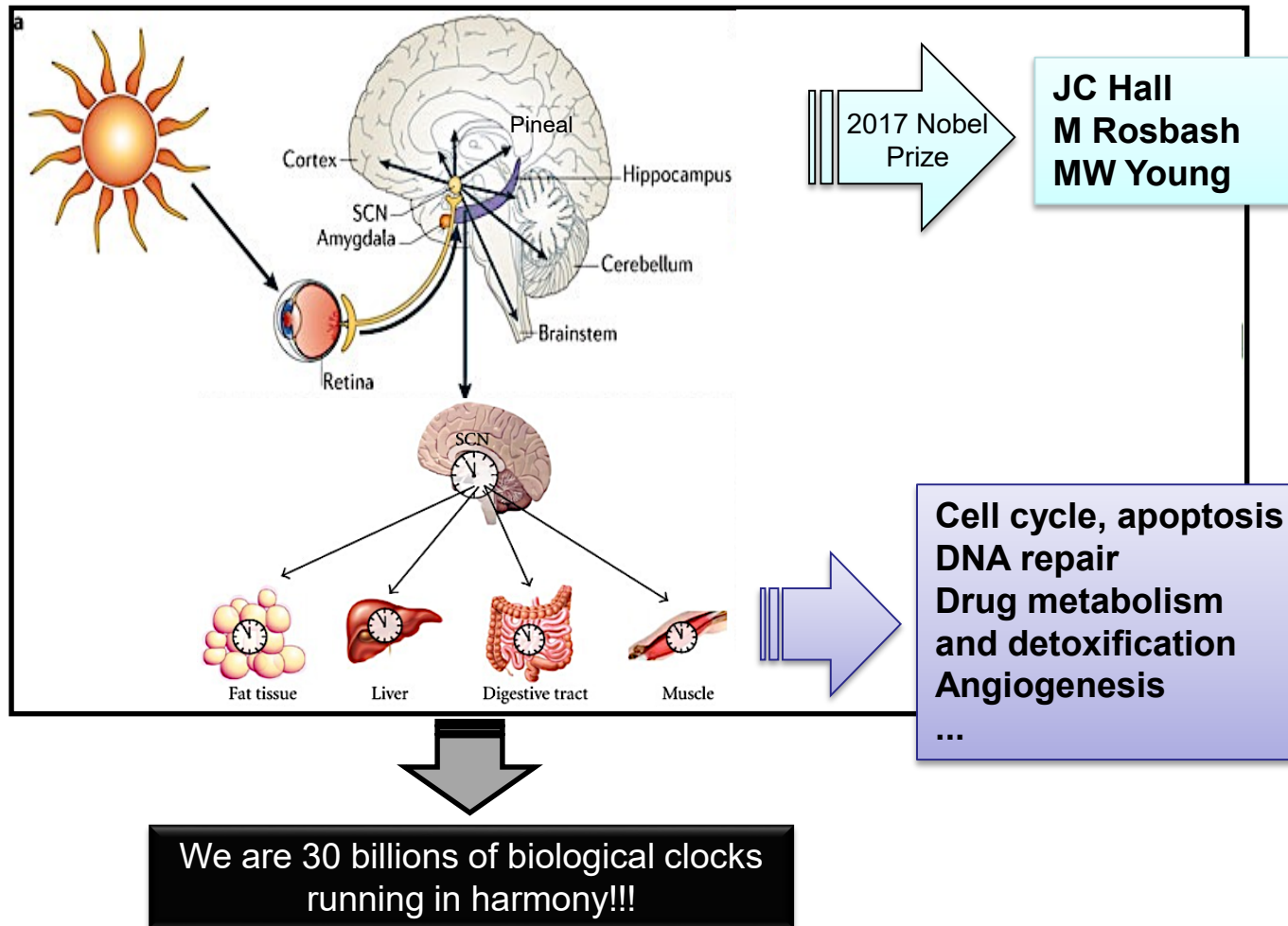
- 1. How the living beings function**
- 2. How DST impacts health**
- 3. First expert statement publication on DST deleterious effects**

1. How the living beings function

Biological clocks coordinately keep life on time:

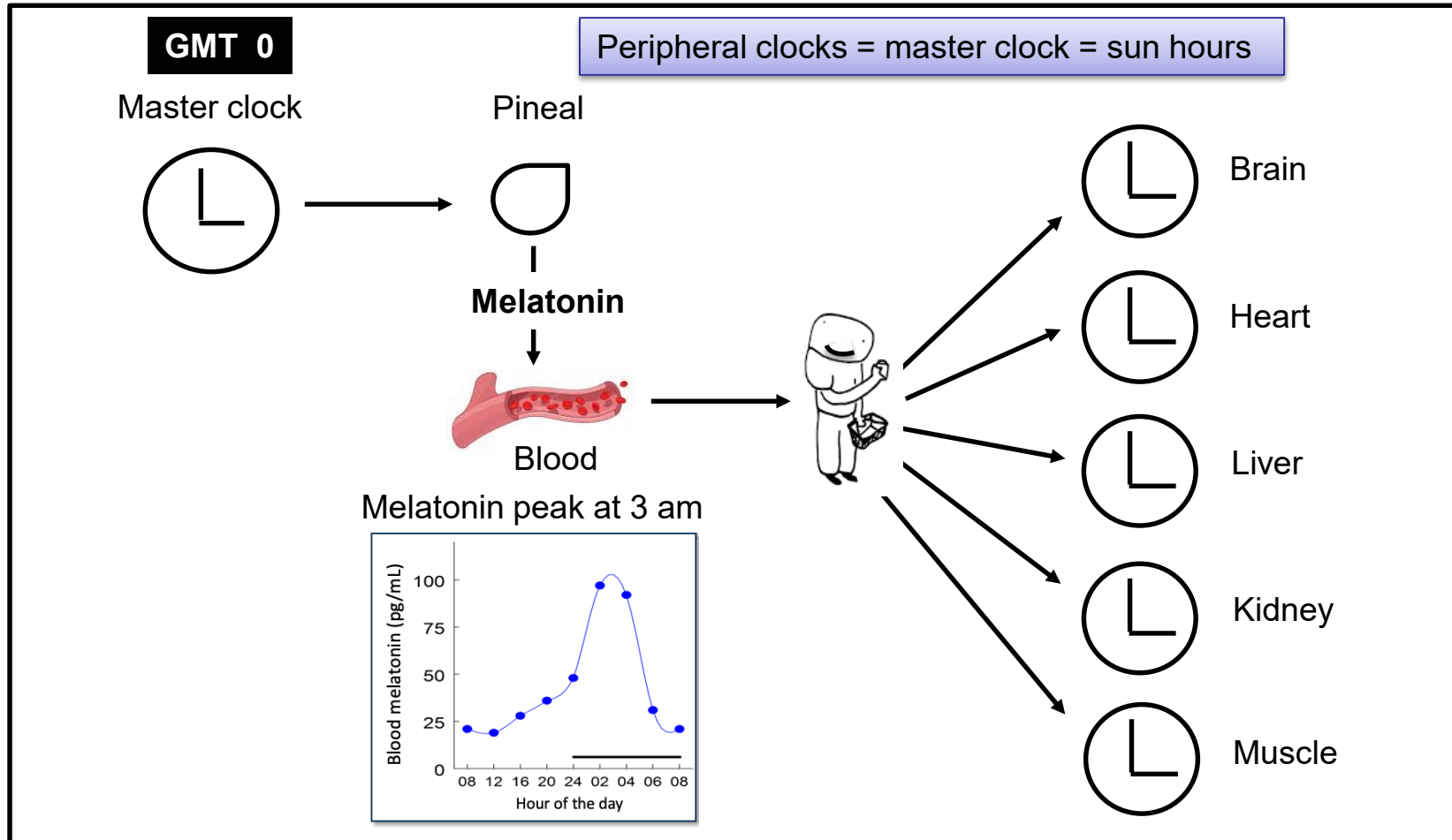
- Master clock controls the adaptation of the human body to the environment
- The human body contains 30 billions of biological clocks
- Circadian timing system comprises a complex network between master (central) and peripheral clocks
- Master clock maintains the harmony of the human body through melatonin, which sets the peripheral clocks

Biological clocks coordinately keep life on time



Biological clocks coordinately keep life on time

STANDBY CLOCK



2. How DST impacts health

Dissociation between environmental light and biological clocks:

- DST change is not immediately transduced to the biological clocks
- Sunrise and sunset times remain the same, but clocks time changed
- As an example, a great difference exists between one-hour DST and one hour traveling to West

Dissociation between environmental light and biological clocks

Traveling one hour to West



Get up and go to bed one hour later in close association to one hour of delay in the sunrise and sunset respect to subjective internal time (SIT)



This promotes a phase-delay which accelerates our synchronization

Hour change in Fall



We will get up and go to bed also an hour later, but the sunset and sunrise will continue at the same time with respect to SIT



Thus, we will be exposed to more light in the morning and less in the afternoon, favouring a phase-advance that counteracts our rapid synchronisation

Traveling one hour to East, similar to the DST in March, yields a similar pattern of behavior

2. How DST impacts health

Desynchronization of peripheral clocks:

- The resultant chronodisruption, i.e., dissociation between environmental time and biological clock time affects the organism in multiple forms
- There are times of risk to suffer disease that are regulated by circadian machinery acting on a complex clusters of genes

Desynchronization of peripheral clocks

DST CHANGE IN FALL

Peripheral clocks = master clock \neq sun hours

CHRONODISRUPTION

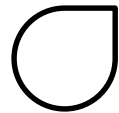
GMT +1

Master clock

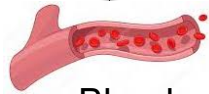


one-hour turn the clock back

Pineal

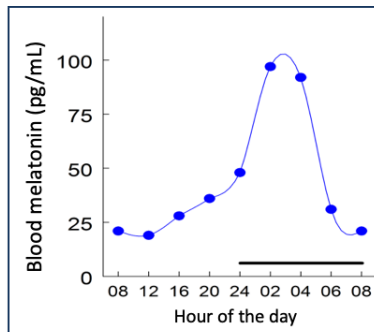


Melatonin



Blood

Melatonin peak at 3 am



Brain

→ Mental health disorders



Heart

→ Heart diseases



Liver

→ Obesity



Pancreas

→ Diabetes



Muscle

→ Weakness



Immune system

→ Inflammation



Any organ

→ Cancer

3. First expert statement publication on DST

Clinical, observational and epidemiological studies:

- It is still common that people think in sleep when speaking about circadian rhythms
- Not only sleep, but the body comprises thousands of rhythms, from hormones to immunity, meal time, exercise performance, blood pressure, alertness, cognitive, ...
- All these are altered after DST changes

Clinical, observational and epidemiological studies

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Review

Impact of Daylight Saving Time on circadian timing system: An expert statement

Meira e Cruz M.^{a,*}, Miyazawa M.^b, Manfredini R.^c, Cardinali D.^d, Madrid J.A.^e, Reiter R.^f, Araujo J.F.^g, Agostinho R.^h, Acuña-Castroviejo D.^b

1. There is sufficient scientific literature showing **the adverse impact of the DST** on different levels of circadian timing system, either related to circadian master clock and multiple peripheral oscillators from which depends adequate organic function.
2. Since there is evidence on the potentially negative effects of DST-related disruption of circadian timing system associated to several negative health outcomes, **DST cannot be encouraged and therefore should be discontinued.**