

The interruption of biological rhythms during chemotherapy worsen its side effects

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The circadian system, better known as our biological clock, is responsible for coordinating all the processes that take place in our organism.

If it does not function correctly, what is known as a circadian disruption or chronodisruption, has for years been linked to an increased incidence of cancer, obesity, diabetes, depression, [cognitive problems](#) or cardiovascular diseases.

"Also, circadian disruption in cancer patients aggravates the prognosis of the disease and the chance of survival for these patients diminishes," Elisabet Ortiz Tudela, a researcher at the University of Murcia, told SINC.

The expert is the author of a study published in the *International Journal of Cancer*, which reveals the importance of assessing how the [circadian system](#) works in order to prevent chronodisruption and to implement measures to strengthen the biological clock in people whose system is damaged.

However, measuring how the [biological clock](#) works is not easy in humans given that the "machinery" is located within the [suprachiasmatic nucleus](#) in the hypothalamus, deep within the brain.

"Therefore, it is impossible to directly assess how the clock works," adds Ortiz. "Today, [biological rhythms](#) are studied which are clock "interruptions" and which enable us to indirectly assess the status of the circadian system".

One of the most studied "interruptions", which can be measured with non-invasive techniques and during long periods of time, is the activity-rest rhythm.

Chronotherapy for cancer

Researchers characterised the evolution of the circadian system in [cancer patients](#) submitted to a

standard chronotherapy protocol (synchronisation of medication with natural rhythms). The activity-rest rhythm was recorded in 49 patients with advanced cancer while being given a standard chronomodulated chemotherapy cycle, which resulted in circadian disruption.

All the parameters calculated according to the activity-rest rhythm worsened considerably with the chemotherapy. Also, the existence of circadian disruption during the treatment was linked to greater fatigue and body weight loss, two of the most worrying associated factors for doctors.

"After the treatment and at the end of the study, the mean values of all the parameters were recovered to near baseline values," stated the scientist from the institution in Murcia.

The results show four different patterns with regard to the evolution of the circadian system in response to the treatment: in 9.5% of the patients the activity-rest rhythm remained stable despite the chemotherapy, 14.3% of [patients](#) showed some improvement, 31% suffered alterations in response to the treatment and recovered completely at the end of the study and in 45% of these deterioration sustained, possibly through inadequate dosing or incorrect timing.

This effect shows the great differences between individuals, which could affect the effectiveness of the treatment.

"Minimising circadian disruption through the personalisation of chronotherapy delivery could help to improve clinical tolerability and potentially contribute towards the treatment being more effective," concludes Ortiz.

More information: Ortiz-Tudela E, Lurisci I, Beau J, Karaboue A, Moreau T, Rol MA, Madrid JA, Lévi F, Innominato PF. "The circadian rest-?activity rhythm, a potential safety pharmacology endpoint

of cancer chemotherapy". *Int J Cancer*. 2014 Jun
1;134(11):2717-25. DOI: [10.1002/ijc.28587](https://doi.org/10.1002/ijc.28587).

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