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DIFFERENCES IN CIRCADIAN FUNCTION BY STAGE IN PATIENTS WITH NON-SMALL CELL LUNG CANCER

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OBJECTIVES: The natural history of neoplastic diseases reveals a link between a disrupted circadian/sleep functions and many of the symptoms that degrade the patients' quality of life (QoL). There is emerging evidence that suggests lung cancer patients are at high risk for problems associated with disrupted circadian function; poor sleep quality, fatigue, and decreased QoL. Herein, we report on the first study that integrates clinical data and wearable devices in order to determine the factors that predict poor health status and to design personalized interventions that will improve patients' QoL.

MATERIAL AND METHODS: We analysed circadian rhythms in 119 non-small cell lung cancer patients (39.5% females) aged 65,13±9,46 (mean ± SD) who were monitored with Kronowise® wearable device, compared to healthy controls (digital twin) matched by age, weight, and height (Table 1). Patients were included in CLARIFY Project (European Union's Horizon 2020 Research and Innovation Programme; grant agreement No. 875160) and written informed consent was obtained prior enrolment in the study. Patients were classified by disease stage: 1) 39 localized disease (stages IA-IIIB) and 2) 80 metastatic disease (stages IIIC-IV). All patients were monitored during oncologic treatment: 51% received chemotherapy, 17% immunotherapy, 18% TKIs and 14% no treatment.

RESULTS: Peripheric body temperature was lower during the day and night periods in all lung cancer patients (LCP) compared to controls. Patients are less active during the day, and more active during the night. Circadian health status of LCP was poorer than in controls (Fig.1). Early stages had a more pronounced 'aged pattern' than those with a metastatic disease, and showed lower activity during the day than during the night. Circadian rhythms of early stages were more delayed than in controls (Fig. 2 and 3).

Population	Localized	Metastasic
Characteristic	**Avg±Std**	**Avg±Std**
Age	67.51±9.55	63.98±9.14
Height	166.62±8.68	167.75±7.61
Weight	72.52±13.16	71.07±15.21
BMI	26.03±3.89	25.16±4.76
Gender (female)	38.40%(15)	40%(32)

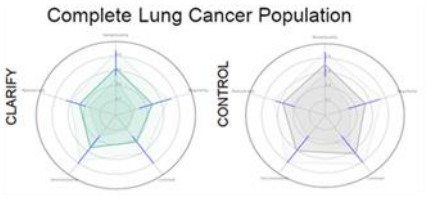

Figure 1. Radar representation of circadian health status

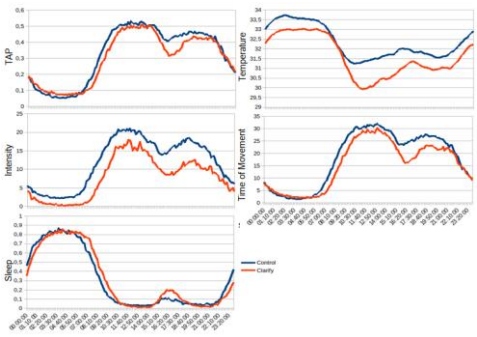

Figure 2. Mean wave-forms for metastatic

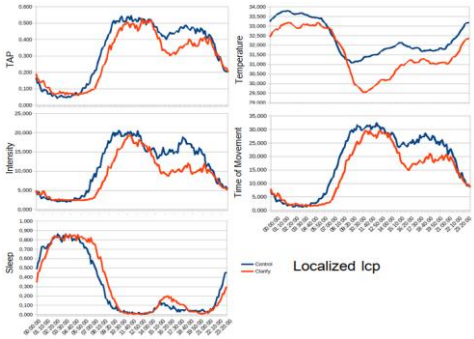

Figure 3. Mean wave-forms for early stage

CONCLUSIONS: Early stages have worse circadian rhythms, which may have negative impact on their QoL compared to patients with metastatic disease, as these patients maintain lower levels of physical activity and more disrupted sleep patterns. We have observed a significant decrease in body temperature in LCP, which will be the subject of future investigations.

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CLARIFY Cancer Long Survivor Artificial Intelligence Follow-up.

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