Circadian rhythm and circulating cell-free DNA release on healthy subjects

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Background & objectives

In the last decade, clinical studies have investigated the clinical relevance of circulating cell-free-DNA (ccfDNA) as a diagnostic and prognosis tool in various diseases including cancers. However, limited knowledge on ccfDNA biology restrains its full development in the clinical practice. To improve our understanding, we evaluated the impact of the circadian rhythm on ccfDNA release in healthy subjects over a 24-hour period.

Methods

20 healthy male subjects underwent serial blood sampling (8:00 AM, 9:00 AM, 12:00 PM, 4:00 PM, 8:00 PM, 12:00 AM, 4 AM (+1 Day) and 8 AM (+1 Day)). We performed digital droplet-based PCR (ddPCR) assays to target 2 DNA fragments (69 & 243 bp) located in the *KRAS* gene to determine the ccfDNA concentration and fragmentation profile. As control, half of the samples were re-analyzed by capillary miniaturized electrophoresis (BIAbooster system).

Results

Overall, we did not detect any influence of the circadian rhythm on ccfDNA release. Instead, we observed a decrease in the ccfDNA concentration after meal ingestion, suggesting either a post-prandial effect or a technical detection bias due to a higher plasma load in lipids and triglycerides. We also noticed a potential effect of gender, weight and creatinine levels on ccfDNA concentration.

Conclusion

Oerall, we did not detect any influence of the circadian rhythm on ccfDNA release.