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Interaction of HTLV-1 Tax with minichromosome maintenance proteins accelerates the replication timing program

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The Tax oncoprotein encoded by the Human T-cell leukemia virus type 1 (HTLV-1) plays a pivotal role in viral persistence and pathogenesis. HTLV-1 infected cells proliferate faster than normal lymphocytes, expand through mitotic division and accumulate genomic lesions. Here, we show that Tax associates with the minichromosome maintenance MCM2-7 helicase complex and localizes to origins of replication. Tax modulates the spatiotemporal program of origin activation and fires supplementary origins at the onset of S phase. Thereby, Tax increases the DNA replication rate, accelerates S phase progression but also generates a replicative stress characterized by the presence of genomic lesions. Mechanistically, Tax favors p300 recruitment and histone hyperacetylation at late replication domains advancing their replication timing in early S phase.

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