Influence of Hydroxychloroquine Dosage on the Occurrence of Arrhythmia in COVID-19 Infected Ventricle

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The interaction mechanisms of Hydroxychloroquine (HCQ) in a COVID-19 infected ventricle and its vulnerability to arrhythmogenesis for different dosage levels is not clearly understood. To address this, a 2D transmural anisotropic ventricular tissue model consisting of endocardial, midmyocardial and epicardial myocytes are configured for *mild* and *severe* COVID-19 conditions as well as for three dosage levels of HCQ (1 μM, 10 μM and 100 μM). Results show that under control and *mild* COVID conditions, increasing the dosage of HCQ prolongs the QT interval as well as QRS duration, although under *severe* COVID-19 conditions, inverted T-waves are observed. In addition, on pacing with premature beats (PBs), it is observed that under all condition, premature ventricular complexes (PVCs) are created at 1 μM and 10 μM HCQ. However, the PVCs are sustained for a longer duration in presence of 10 μM HCQ. ST elevation is observed under *mild* COVID-19 conditions and 1 μM HCQ and reentrant arrhythmic activity is generated in *severe* COVID-19 conditions and 10 μM HCQ dosage. Under all conditions, 100 μM HCQ doesn't generate arrhythmia or PVCs in presence of PBs. This in-silico ventricular model indicates that the dosage of HCQ as well as pacing sequence influences the appearance of arrhythmic activity and could help in guiding HCQ therapy.

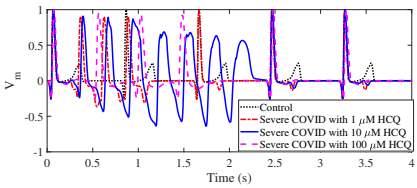

Figure 1. Pseudo ECGs generated on pacing the *severe* COVID-19 infected ventricle tissue with PBs in presence of HCQ