SUSTAINABLE ORGANIZATION OF BIOBANK FREEZING INFRASTRUCTURE TO BE A SAFE HARBOR FOR BIOMATERIALS

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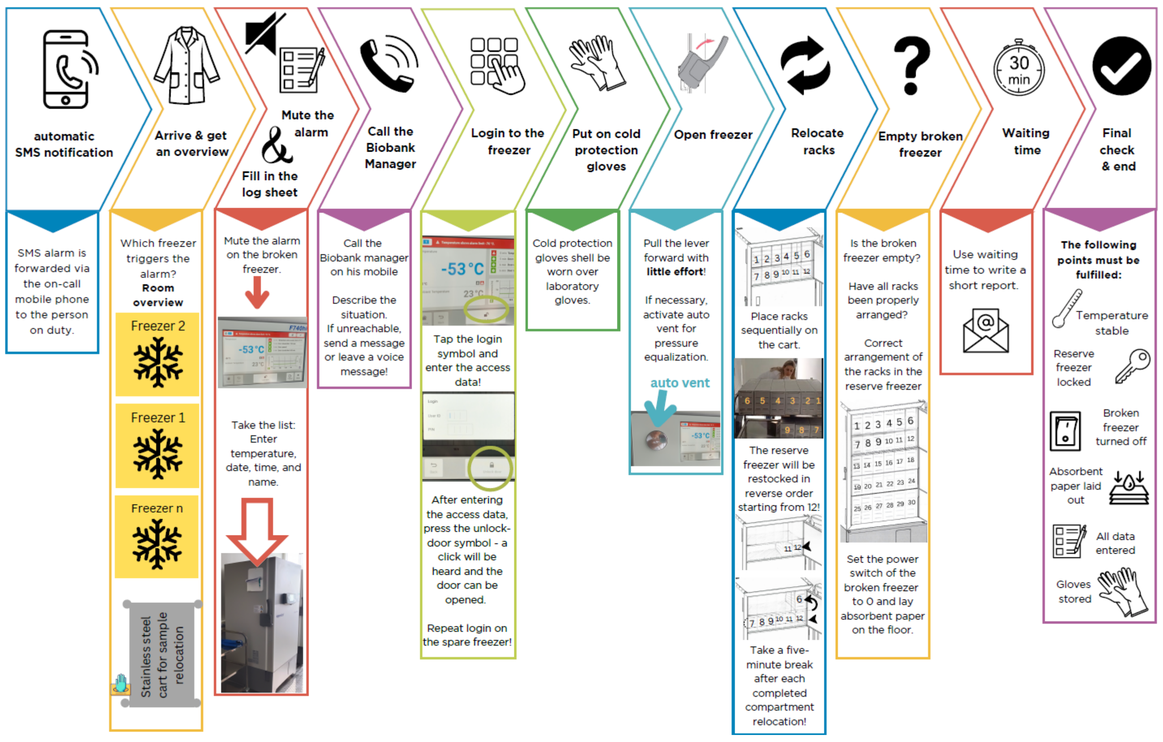
INTRODUCTION

A key task of biobanks is to guarantee that biomaterials are stored under safe temperature conditions, which includes permanent maintenance of the cold chain under predefined temperature values. We report our undertaking to set up an emergency system from scratch and our initial experiences in the follow up period. The system contains technical components, computer and communication tools and trained staff.

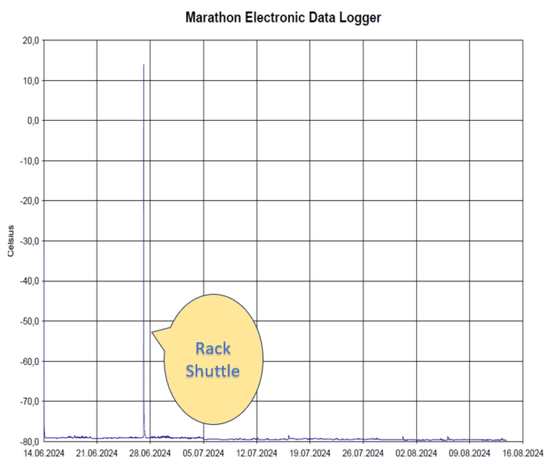
TEMPERATURE SECURITY

Temperature Security Measure	Security Classification
a. Primary system: Freezing units connected to facility management system (Honeywell®) AND b. Backup system: monitoring + alarm (VisioNize®, BIOSAFE®-view InfoAlarm)	a. Alarm b. Monitoring + Alarm
Notification (automatic SMS) and on-call duty of emergency staff (24/7) according to emergency plan	Rescue
Equivalent reserve freezing units	Rescue
Sample rack monitoring outside of freezing units: Use of data logger	Monitoring
Deep freeze temperature hold time: Storage in ULT freezer versus storage in liquid nitrogen vapor phase	Preventive

EMERGENCY PLAN

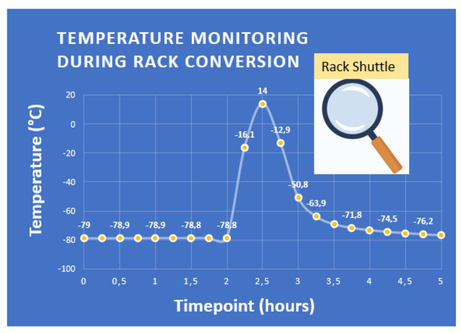


RACK TRANSFER T-CONTROL

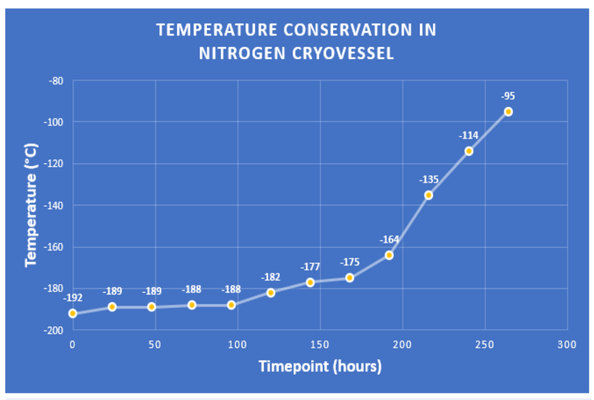


Simulation: Rack Transfer and Temperature Monitoring with Data Logger

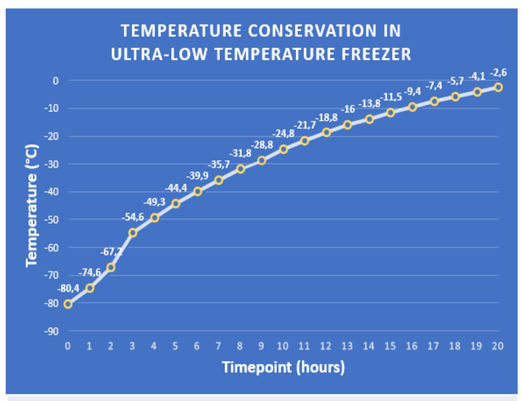
Position of Data Logger in cryobox / surrounded by air



DEEP FREEZE HOLD TIME



Nitrogen vapor phase tank: Temperature hold TEST
Not loaded with rack towers
50 Liter Liquid Nitrogen reservoir; 490 Liter vessel volume
T = 0: Nitrogen supply stopped
Cover of vessel permanently closed during observation time (264 h)



Ultra low temperature chest freezer: Temperature hold TEST
Not loaded with rack towers
740 Liter capacity volume
T = 0: Electricity interrupted
Freezer permanently closed during observation time (20 h)

RISK FACTOR PREVENTION

Risk Factor	Preventive action
Failure in alarm chain and emergency staff is not notified	Independent, secondary alarm notification
Reserve equipment not ready for use	Ensure to have reserve storage space close to sample freezing units (ideally analogous model)
Blackout: insufficient backup electricity	Storage in nitrogen vapor phase to have prolonged deep freeze temperature hold time
Equipment failure: Fast temperature increase in ULT freezer	a. Equipment with 2 independent refrigeration circuits b. Free space: replace with cool packs
Uncontrolled biomaterial temperature in case of emergency transfer	Monitoring: Data logger Regular training of emergency staff

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BIOBANKING FOR A HEALTHIER WORLD