



International Cold Exposure Database (Drugs) (ICED(D))

A Novel Resource for the Circumpolar Community

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The handling of pharmaceuticals whilst operating at extreme reach and in extreme temperatures can be challenging. Maintaining cold chains and medical stores at appropriate temperatures whilst working in deep field conditions adds an additional layer of complexity to operational planning to ensure if needed, emergency drugs are not frozen and suitable for use.

Nations operating within the Polar environment usually utilise pharmaceuticals which are designed, researched and marketed to be used within healthcare facilities which operate at “room temperature”.

But what if there were agents that were permissible to be stored as depots in the deep field? What if there were agents that could undergo multiple freeze-thaw cycles and still be safe for use?

It is our intention to propose a novel, international, collaborative project looking at the effect of the polar environment on pharmaceutical agents (including their storage and delivery systems) to better inform those operating and providing remote support in extreme cold and at extreme reach.

The International Cold Exposure Database (Drugs) or ICED(D) is proposed as the first in a series of international collaborative projects looking to enhance the medical capability across the continent.

The aim of the project would be to review multiple agent exposure to sub-zero temperatures and repeated freeze-thaw cycles to review for:



- Possible increasing cryo-concentration after freeze/thaw solute loss
- Viable isomer formation or maintenance of existing drug molecular structure
- Absolute freezing point/lowest operational temperature
- Modification to dosing regimens/schedules if undergoing freeze/thaw cycles.

Although the above represents a small sample of the possible aims for this project, it is hoped that when considered in conjunction with other workstreams, the impact of any outcomes will be far greater. When considering enhanced telemedicine or reach-back capabilities, the ability to store medications for longer and outside of traditional hard standing infrastructure may enhance the delivery of medical care.

This would increase the understanding of the use of drugs and delivery systems outside of normally available temperature range information.

In turn this would be expected to lead to an improvement in awareness of drug safety margins, thus increasing patient safety as well as potentially reduce waste and cost in those drugs that do move outside the recommended or published ranges.

The ICED(D) would be a truly collaborative project, utilising the currently available literature to guide all interested nations in working towards the shared aim. The ability to support remote operations without a strict warm chain and utilise medications that have undergone freeze/thaw cycles may have direct benefit for safety assurance, patient care and potential environmental impact from reduced freight transfer and temperature maintenance.

Collaboration shares workload, increases information learned synergistically across traditional boundaries in keeping with the principles of the Antarctic Treaty. It directly benefits those working within Polar environments who are likely to be operating with reduced medical facility, communications and resource compared to their home environment.