EDITORIAL

Storage of wine and blood

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'Poets are like proverbs: you can always find one to contradict another'. Jules Verne (1828–1905) French Novelist Fig. 1.

Storage of wine and blood have been written about for millennia. Most of us, with the probable exception of some obstetricians and oncologists, do not live in an 18th century house with a built-in large wine cellar. For most of us, a more modest storage facility is adequate. Several people resort to storing wine in a wine rack in their kitchen, which is not ideal as it exposes the wine to fluctuations in temperature and light and varying smells [1]. Some of the very rich have purpose-built wine cellars in their contemporary houses but this undoubtedly has a snob value. There is no guarantee that the owners of these valuable collections have any expertise in wine provenance or tasting. I met a cardiologist recently who boasted of a collection of 5000 bottles. It is doubtful that at his age (undisclosed) he would be able to sample a significant number of those bottles! However, this pales into insignificance beside the wine cellar of the late Luigi Veronelli at 135,000 bottles as recently reported by Jancis Robinson [2].

Storage of wine under the sea is an intriguing story. An article by Hoffman from 2015 was recently brought to my attention by my wife [3]. It seems that a ship was sunk near Finland in the early part of the 19th century. Among its cargo were several bottles of champagne (Fig. 2). Interestingly, the French expert Philippe Jeandet got his hands on some of the wine and declared it to be in excellent shape. Apparently, the pressure exerted by the sea, the ability of very small amounts of oxygen to penetrate the corks and the lack of sunlight all helped to maintain the champagne in excellent condition. Since then, several famous champagne producers have taken the plunge! I have not had the opportunity, yet, to taste champagne stored under the sea but over the festive season I consumed some English sparkling wine from Nyetimber, which was excellent [4].

Bubbles in champagne and other sparkling wines occur due to ingredients called surfactants. These surfactant-like molecules help to reduce the tensions between the liquid and the gas bubbles and are very important in respiratory physiology. As I have said before, never wash champagne glasses in soapy water!

My first, and only, interface with the deep sea was the reading of Jules Verne's novel 20,000 Leagues under the sea as a child. It was originally serialised in Pierre-Jules Hetzel's fortnightly periodical 'the *Magasin d'éducation et de récréation*' in 1869 and published as a book in 1871. I do not remember any reference to champagne but I can still recall vividly the face of Captain Nemo, played in the film by James Mason. The film was directed by Richard Fleichner and produced by Walt Disney in 1954. It was one of the earliest films to be made in CinemaScope. Verne died in Amiens, France in 1905 (Fig. 3).

Can you store red blood cells or haemopoietic stem cells under water? I don't think so, but you certainly can freeze erythrocytes or stem cells and preserve their viability. In a recent review Whaley and colleagues wrote *'The origins of low-temperature tissue storage research date back to the late 1800s. Over half a century later, osmotic stress was revealed to be a main contributor to cell death during cryopreservation. Consequently, the addition of cryoprotective agents (CPAs) such as dimethyl sulfoxide (DMSO), glycerol (GLY), ethylene glycol (EG), or propylene glycol (PG), although toxic to cells at high concentrations, was identified as a necessary step to protect against rampant cell death during cryopreservation. In addition to osmotic stress, cooling and thawing rates were also shown to have significant influence on cell survival during low temperature storage. In general, successful low-temperature cell preservation consists of the addition of a CPA (commonly 10% DMSO), alone or in combination with additional permeating or non-permeating agents, cooling rates of approximately 1 °C/min, and storage in either liquid or vapor phase nitrogen* [5].

Cryopreservation (freezing) of human tissue has been a goal of biologists/haematologists for many years but it is only fairly recently that the technology has been standardised. Henkleman

Fig. 1 Jules Verne. Source Wikipedia. Author unknown. Creative Commons Attribution-Share Alike 2.0 generic license.

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Fig. 2 A glass of champagne. Source Wikipedia.

Fig. 3 Jules Verne's tomb in Amiens, France. Source, Wikipedia.

and colleagues [6] claim that the Vietnam war was a major stimulus for cryopreservation of erythrocytes. That may well be true but it is extremely difficult to obtain figures on the usage of cryopreserved erythrocytes. Likewise, another usage is for essential blood transfusion for patients with excessively rare blood groups, and again it is difficult to estimate the usage of such products. One has to assume that the usage of cryopreserved erythrocytes is minimal.

When Eliane Gluckman published her seminal paper on the use of umbilical cord blood [7] as an adequate source of haemopoietic stem cells to sustain a transplant for a child with Fanconi Anemia, a lot of interest was shown worldwide. Although the technology for collection of umbilical cord blood for transplantation is now well established and standardised it still remains a costly procedure and take-up remains relatively low. According to Professor Mary Horowitz, Deputy Cancer Centre Director of the CIBMTR (Centre for International Blood and Marrow Transplant Research) the number of cord blood transplants in the last year when data was available is less than 10%. Anecdotal evidence suggests that the cost of maintaining cryopreserved erythrocyte and umbilical cord banks may becoming prohibitive because of high costs and limited usage. The expansion of the stem cell donor pool to include haploidentical donors may further limit the use of frozen umbilical blood for transplantation.

Most of us will never drink champagne which has been stored under water or have a requirement for cryopreserved erythrocytes or umbilical cord blood. In the meantime, enjoy a glass or two of sparkling wine from France or any other country and don't forget sparkling wine from England!

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AUTHOR CONTRIBUTIONS

Shaun McCann is the sole author and responsible for all the ideas and writing.

COMPETING INTERESTS

The author declares no competing interests.