What Dolly can tell us about genetic aging

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Key Words: health, mammal cloning, SCNT, sheep.

Dolly the sheep (Figure 1), the first mammal cloned from an adult somatic cell, was born on July 5, 1996, and she lived for 6 and a half years, until February 14, 2003 (Eletreby 2018; Roelen 2020). Dolly was cloned using a technique called somatic cell nuclear transfer (SCNT), where the nucleus of an adult cell was transferred into an enucleated egg cell (Burgstaller & Brem 2016; Roelen 2020).

Figure 1. Dolly was stuffed after her death in 2003, and is now displayed at the National Museum of Scotland, Edinburgh (Roelen 2020).

Dolly's health and longevity were subjects of scientific interest and scrutiny. She did experience some health issues during her life. In 2001, at the age of five, Dolly was diagnosed with osteoarthritis, which is a condition commonly observed in older sheep (Eletreby 2018). Additionally, she developed a lung disease, which may have been

related to a respiratory virus she contracted in early life (Eletreby 2018). However, it is important to note that Dolly's health issues were not conclusively attributed to her being a clone (Eletreby 2018). Furthermore, a cohort of 13 cloned sheep did not present a conclusive relationship between the SCNT process and the health of the clones, although some mild osteoarthritis was observed (Sinclair et al 2016). Many sheep, especially those of certain breeds, can develop health problems as they age.

Dolly's lifespan was somewhat shorter than what might be expected for a normal sheep of her breed (Finn Dorset), which typically have a lifespan of around 10 to 12 years. Dolly lived for a little over 6 years (Eletreby 2018). Her shorter lifespan led to discussions about whether the cloning process might have had an impact on her health and aging (Eletreby 2018).

While Dolly's case provided important insights into cloning technology, it is important to keep in mind that she was just one individual, and drawing broad conclusions about the effects of cloning on longevity and health based solely on her case would be premature. Since Dolly's creation, other cloned animals have been produced, and further research has been conducted to better understand the potential implications of cloning on health and aging (Konishi et al 2011; Schmidt et al 2015; Sinclair et al 2016; Greenfield 2021).

The production of Dolly showed that genes in the nucleus of such a mature differentiated somatic cell are still capable of reverting to an embryonic totipotent state (Chiu & Harley 1997), creating a cell that can then go on to develop into any part of an animal (Eletreby 2018).

Conclusions. Dolly the sheep was the first mammal cloned from an adult somatic cell. The sheep presented some health issues during its life. It is not recommended to draw general conclusions regarding aging and health drawn from this singular case.

Conflict of Interest. The author declares that there is no conflict of interest.

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Received: 08 May 2023. Accepted: 22 May 2023. Published online: 30 June 2023.
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How to cite this article:
Petrescu-Mag I. V., 2023 What Dolly can tell us about genetic aging. ABAH Bioflux 15(1):18-20.