

A Novel Method for Enhanced Bone Marrow Collection in Non-human Primates: Improving Yield and Cell Viability for Downstream Analysis

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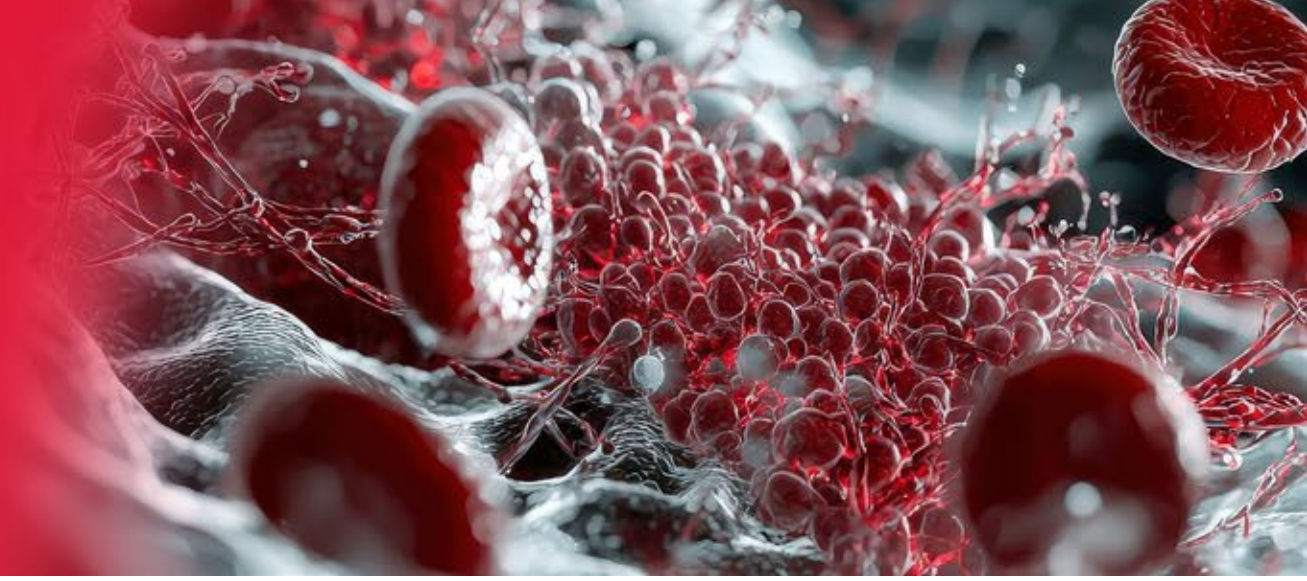
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#3451-H596

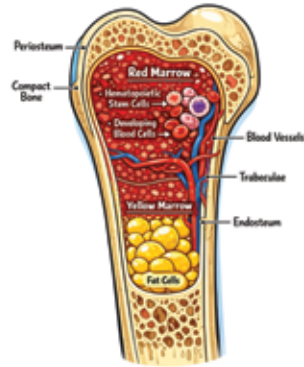
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INTRODUCTION

Bone marrow tissues are valuable and essential samples to diagnose, monitor and research a wide range of hematologic and systemic diseases. As the primary site of blood cell production, bone marrow tissues are valuable samples for studies on hematopoiesis and immune cells. In both preclinical and clinical settings, bone marrow collection is an important method to obtain samples to further scientific understanding of therapeutic responses in hematopoietic and immune systems and advance patient care. Therefore, proper collection techniques to ensure adequate volumes of high-quality samples are critical to ensure cell viability and assay accuracy.

Figure 1: Illustration showing anatomical features of the bone marrow.



CENTRIFUGATION COLLECTION PROCESS

The centrifugation of whole bones is an effective and widely used technique for post-mortem bone marrow collection in animal research models, usually in mice and rats. After harvesting long bones such as the femur or humerus, the distal epiphyses are removed, and the bone is placed vertically in a collection tube for centrifugation, with the proximal epiphysis at the top of the conical tube. This process uses centrifugal force to rapidly expel marrow from the medullary cavity, providing a high-yield, minimally diluted sample. Biomere has expanded this technique to non-human primates to further collection methods and optimize the terminal bone marrow yield.

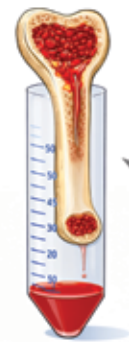


Figure 2: Visual image of centrifugation set up.

Bone marrow centrifuged from a cut humerus bone.

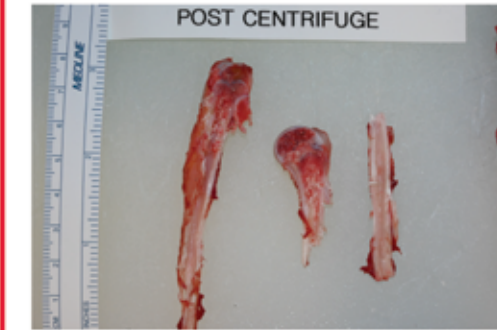


Figure 3: Visual image of bones post centrifugation.

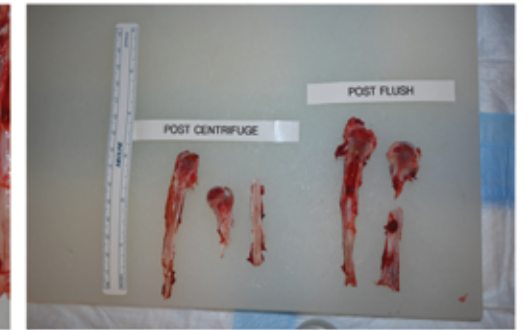


Figure 4: Visual image of bones post centrifugation and scraping with a flush.

SCRAPING COLLECTION PROCESS

The scraping collection method is a standard technique for post-mortem bone marrow harvesting in larger animal research models. Following procedures similar to those described for centrifugation-based extraction, long bones are typically split longitudinally to expose the medullary cavity and facilitate marrow retrieval. A sterile laboratory spatula or comparable instrument is then used to mechanically scrape the bone marrow from the cavity into the appropriate collection medium or container. While this method is straightforward and widely used, it does not consistently achieve complete evacuation of the marrow space.

Additionally, the mechanical nature of the procedure introduces a risk of cortical or trabecular bone fragment contamination, which may affect downstream processing, cell yield, and sample purity.

METHOD COMPARISON

A comparison was performed to further validate the centrifuging method as the superior collection method. Terminal humerus samples were collected from N=2 cynomolgus macaques. Comparing collection yield through total live cell counts and cell viability (%) showed that centrifuging method yielded a significant increased cell count. The left humerus for both animals was scraped and yielded 332.5 million live cells at 89% viability for the first animal and 289.3 million live cells at 90% viability for the second animal. The right humerus for both animals was centrifuged and yielded 737.5 million live cells at 89% viability for the first animal and 602 million live cells at 90% viability. Comparable viability was seen, while a clear significant increase in total live cell counts in favor of the centrifugation method.

CONCLUSION

Bone marrow is a critical tissue for diagnosing, monitoring, and researching hematologic and systemic diseases. As the primary site of hematopoiesis, it provides essential insight into blood cell production, immune status, malignant cell detection, and therapeutic response. Ensuring high-quality sample collection with optimal cell viability and yield is fundamental for accurate downstream analysis in both preclinical and clinical research.

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