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Cryopreservation and replantation of amputated rat hind limbs

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Background: In spite of the relatively high success rate of limb replantation, many patients cannot undergo replantation surgery because the preservation time of an amputated limb is only about six hours. In addition, although allotransplantation of composite tissues is being performed more commonly with increasingly greater success rates, the shortage of donors limits the number of patients that can be treated. So the purpose of this study is to examine the feasibility of cryopreservation and replantation of limbs in a rat model.

Methods: Sprague-Dawley rats were divided evenly into group A (above-knee amputation) and group B (Syme's amputation). One hind limb was amputated from each rat. The limbs were irrigated with Cryoprotectant, cooled in a controlled manner to -140°C , and placed in liquid nitrogen. Thawing and replantation were performed 14 days later.

Results: In group A, the limbs became swollen after restoration of blood flow resulting in blood vessel compression and all replantation's failed. In group B, restoration of blood flow was noted in all limbs after replantation. In one case, the rat chewed the replanted limb and replantation failed. The other rats were followed for three months with no abnormalities noted in the replanted limbs.

Conclusions: Limbs with a minimal amount of muscle tissue can be successfully cryopreserved and replanted.

Biography

Bo He, MD, PhD now is an Associate Professor of Orthopedic and Microsurgery in the First Affiliated Hospital of Sun Yat-sen University. He started cryopreservation research since 2005, and is familiar with preservation and replantation of grafts with/without blood supply. He planned to set up biobank of various frozen tissue and organs, such as fingers, limbs, nerve and other soft tissue. He was once working in Stanford University and indulged in basic research about cryopreservation and tissue engineering. Also, he received the certification of American National Institutes of Health (NIH) for clinical research.

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