

## EDITORIAL | OPEN ACCESS

# Emerging approaches in organ protection through conditioning treatments

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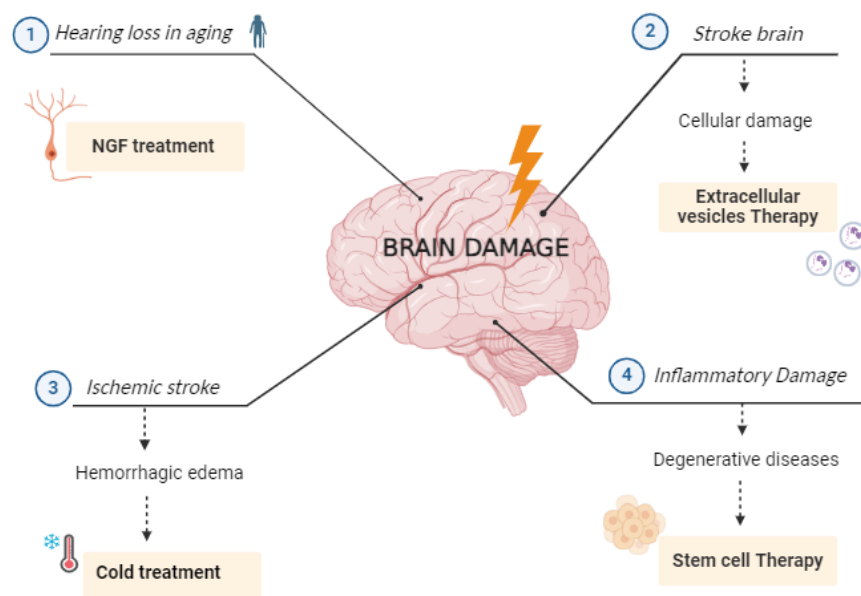


Figure 1. (1) Neurotrophic growth factor (NGF) treatment for age-related hearing loss, (2) Extracellular vesicle therapy and (3) Cold treatment for stroke brain remodeling, and (4) Stem cell therapy as a promising avenue for conditioning medicine in stroke.. Created in BioRender.com

In a world where health-related challenges continue to emphasize the need for new therapeutic solutions and approaches, the October special issue of Conditioning Medicine focuses on Emerging Conditioning Strategies (Figure 1). This special issue opens with the article "Salvaging hearing loss in aging via NGF treatment" by Choudhary and colleagues (2023). This article sheds light on the progress in hearing loss research. Hearing impairment is mainly related to age and exogenous insults that induce inflammation and oxidative stress, leading to cell injury and subsequent hearing loss. The

review highlights the potential of nerve growth factor (NGF) therapy in restoring auditory function through the regeneration of cochlear hair cells, opening new avenues in the treatment of age-related auditory conditions. In particular, the analysis of the biodistribution of NGF (intranasal administration) indicated effective delivery to the cochlea, and aged mice showed improvement in hearing performance and hair cell morphology after intranasal treatment. These data support the role of NGF as an efficient effector for protecting and recovering hearing loss. In the second paper, "Stem cell-derived extracellular

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vesicles participate in remodeling of stroke brain" by Alvarez and colleagues (2023), the innovative role of extracellular vesicles (EVs) released by stem cells in improving cognitive and motor function after a stroke is emphasized. After an ischemic event, inflammation occurs, which exacerbates the neurological damage in the stroke brain. The presence of EVs in the brain has been widely recognized. In fact, endogenous EVs may play a role in conferring transient stroke neuroprotection, which is characterized by glial activation, neurogenesis, and angiogenesis. Since EVs show low immunogenicity and natural biocompatibility, they represent an ideal therapeutic tool for regenerative purposes. This paper highlights the protective properties of EVs in participating in brain remodeling after stroke, thus exploring the development of EV-based stroke therapeutics. Similarly, the article "Stroke gets a cold treatment: hypothermic recombinant tissue plasminogen activator improves neuroprotection" by Borlongan and collaborators (2023) addresses the challenge of vascular edema and hemorrhagic transformation associated with tissue plasminogen activator therapy in stroke. By exploring the concept of combined thrombolysis and hypothermia therapy, this study offers new perspectives on optimizing the treatment of ischemic stroke. In fact, the combined approach of hypothermia therapy with tissue plasminogen activator shows improved neurological function, reduced blood–brain barrier damage, decreased hemorrhagic transformation incidence, and suppressed deleterious inflammatory responses in rats with middle cerebral artery occlusion. Lastly, the article "Repositioning stem cell-based therapies for conditioning medicine in stroke" by Salazar and co-investigators (2023) examines the potential of stem cell therapies in stroke management, proposing a critical review of the current therapeutic landscape and suggesting new research directions for the future. Although several studies highlight endogenous neurogenesis post-stroke in *in vitro* and *in vivo* models, it appears insufficient, indicating the need for exogenous stem cell-based therapy. Since stem cells can induce direct cell replacement and produce paracrine factors, post-stroke brain recovery supported by exogenous stem cells seems to be a promising therapy in neurology.

These articles provide a comprehensive overview of the latest discoveries and promote reflection on the future directions of research and clinical practice in the management of neurological and auditory conditions. By recognizing the significant contributions of the authors and researchers involved, this special issue hopes to serve as a catalyst for further innovations in the field of medical treatment.

### References

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