Metabolic and Non-Pharmacological Modalities Involved in the Growth and Viability of Peripheral Nerves following Surgical Repair: A Systematic Review

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Background

- Traumatic orthopedic injuries are commonly complicated by peripheral nerve injury in the upper and lower extremity.
- Techniques for enhancing nerve regeneration and viability have been trialed, including electrostimulation, but easy to implement, non-pharmacological techniques have not been investigated.
- The aim of this review was to identify the impact of certain factors such as nutritional status, exercise, and smoking status on nerve regeneration following surgical repair.

Methods

- Published prospective, retrospective, and review articles were queried from the PubMed database.

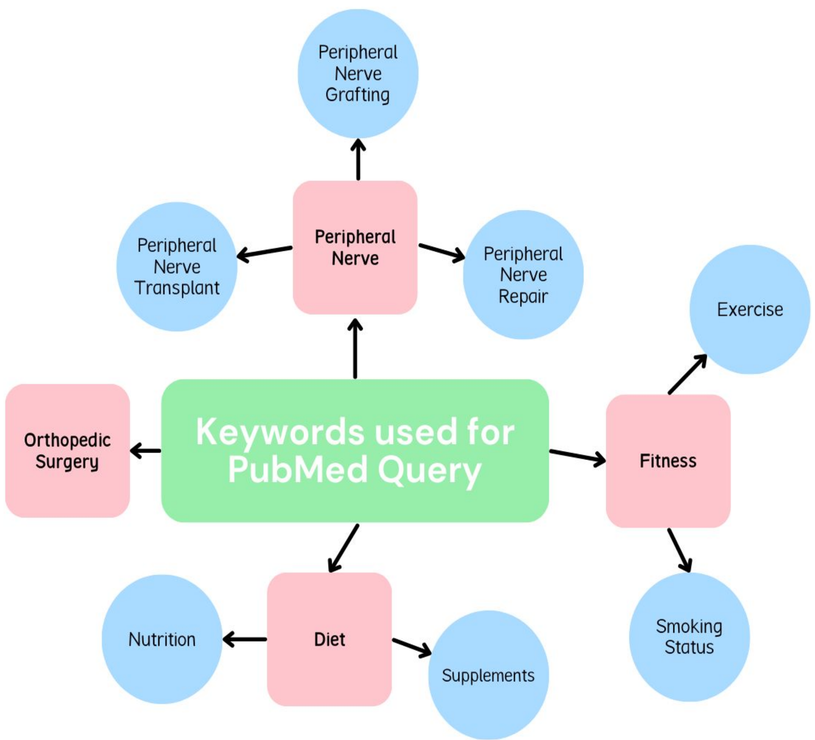

Figure 1. Keywords used for PubMed Query.

Methods (cont.)

- Articles that discuss the central nervous system or the spinal cord were excluded from the study.
- An automated abstract screening tool was implemented by leveraging large language models (LLMs), specifically GPT-4o.
- Advanced prompt engineering techniques, such as Zero-shot Chain-of-Thought prompting, were used to maximize model performance.

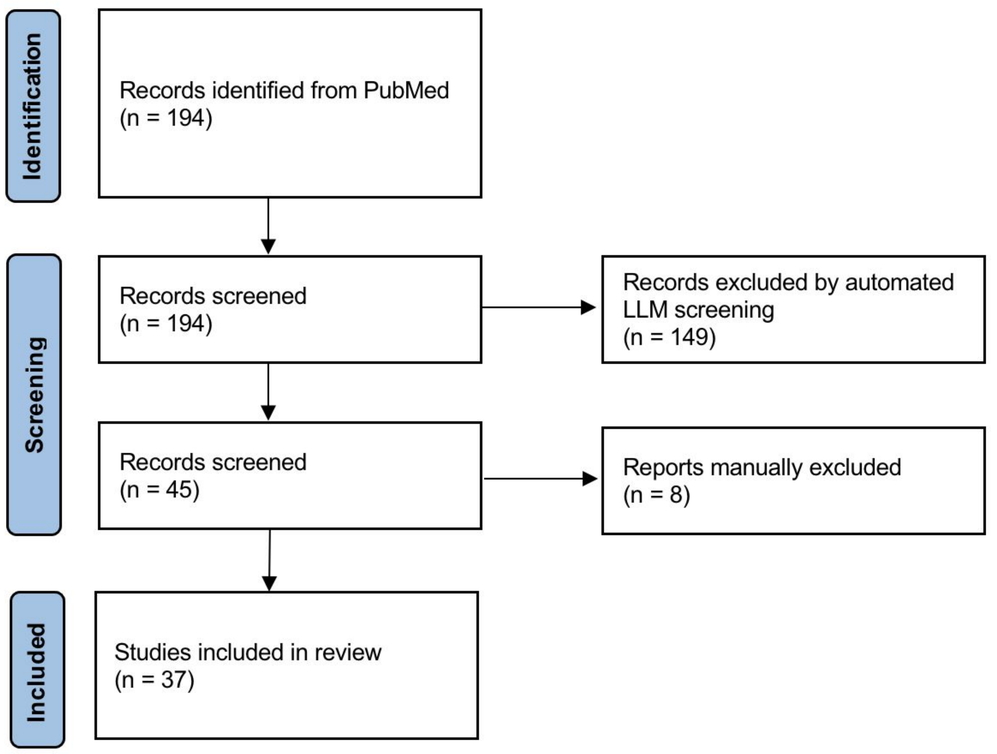

Figure 2. Article Selection Methodology.

Results

- **Nutrition**: Biological effects on peripheral nerve growth and support with readily available supplements such as: **creatinine**, **sesame oil**, and **saffron**.[1]
- **Smoking:** Studies reported mixed findings:
  - Some articles stated that the smoking status of the patient had no effect.[2]
  - Others indicated greater recovery in two-point discrimination for their non smoking patients.[3]
- **Exercise**: Daily moderate intensity cycling workouts were associated with improved axon regeneration of peripheral nerve grafts.[4]
  - Other studies did not establish a clear link.[5]

Conclusions

- Studies have identified nutritional supplements that improve nerve viability in animal models.
- There is an unclear relationship between exercise, smoking, and nerve regeneration
- Future work should focus. non-pharmacological modalities to improve peripheral nerve repair.

References

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