Pharmacogenetics In Anesthesia Concerning Redheads: A Comprehensive Study

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SIGNIFICANCE OF STUDY

- *Study investigates increased anesthetic requirements in red-haired individuals, with implications in anesthesia field.*
- *Red hair phenotype linked to higher anesthetic needs, revealing potential genetic influence on drug response.*
- *Understanding individual variations in anesthetic requirements crucial for better patient care and anesthesia management.*
- *Anesthetic dosing should be tailored based on genetic characteristics, such as melanocortin-1 receptor gene mutations associated with red hair.*
- *Knowledge can improve anesthesia administration for red-haired patients, leading to better outcomes, enhanced safety, and reduced surgical risks.*

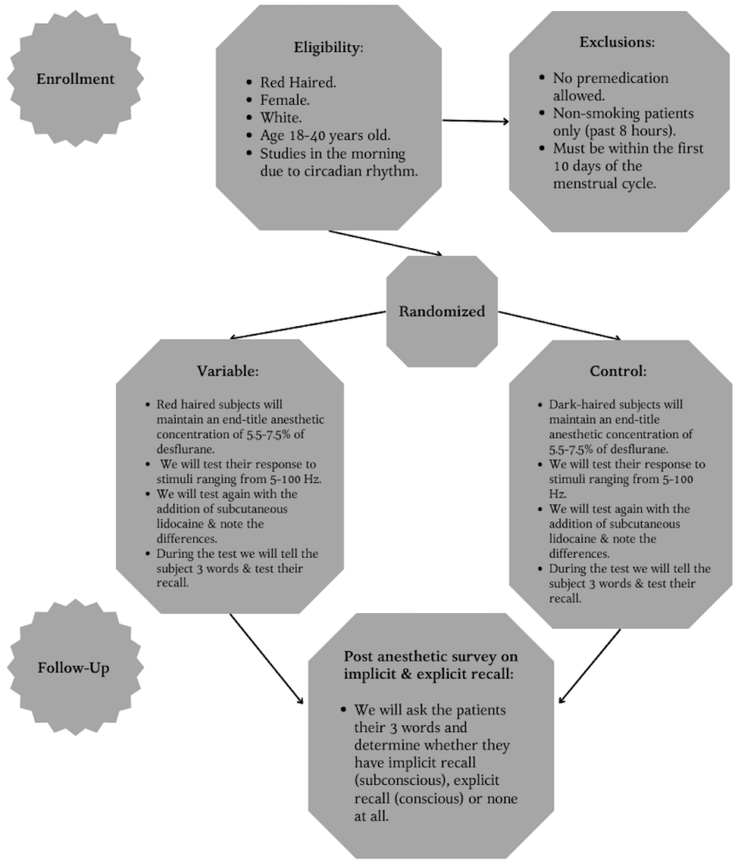
01. Introduction

- This is a comprehensive study based on those conducted by Edwin Liem to explore the impact of natural red hair on anesthetic requirements and phenotypic associations.
- The study focuses on investigating the hypothesis of increased anesthetic requirements in individuals with red hair, specifically looking at the volatile agent desflurane while including sensitivity to thermal stimulation pain and the effectiveness of subcutaneous lidocaine, aiming to determine if the melanocortin-1 receptor gene mutation (redheads) affects anesthetic drug requirements for sedation and analgesia.

02. Materials

- Spectrophotometric hair analysis technology will be used to assess the integrity of the red hair, revealing a absorbance ratio of approximately 0.13 in red-haired patients compared to 0.3 in dark-haired participants, indicating differences in eumelanin and pheomelanin levels.
- Tetanic stimulus from percutaneous needles inserted into the anterior thigh with two electrodes (positive and negative) used to stimulate muscles directly with electrical current.
- Neurometer CPT/C is a diagnostic device for assessing nerve function and detecting peripheral neuropathy. It measures patient's perception of electrical frequencies and intensities on the skin, providing quantitative data on nerve sensitivity and identifying abnormalities in nerve function.
- Researchers employed the TSA-II Neurosensory Analyzer, a specialized computer-controlled device, to accurately measure baseline levels of thermal sensory perception, pain perception, and pain tolerance thresholds, making it ideal for the intended investigation.

03. Methodology



04. Predicted Results

- The red haired participants are expected to feel electrical stimulation at levels higher than the dark-haired participants.
- This should also apply and be heightened by the addition of subcutaneous lidocaine due to the subjects' expected resistance to local anesthetics concerning pain sensitivity.
- Overall, red haired subjects will require an increased anesthetic concentration as well as exhibit higher levels of implicit and explicit recall meaning they will have an increased likelihood of remembering the words that are given to them under anesthesia.

05. Conclusion/Discussion

- In conclusion, combining the findings from the studies conducted by Edwin Liem et al, and this study demonstrates a significant link between natural red hair and increased anesthetic requirements.
- This supports the hypothesis of higher anesthetic requirements in individuals with red hair due to melanocortin-1 receptor gene mutations.
- Research shows important implications for anesthesthetic management, emphasizing the need for personalized dosing based on genetic factors to improve patient outcomes and safety during surgical procedures.
- Red-haired individuals exhibit heightened sensitivity to thermal pain and reduced efficacy of subcutaneous lidocaine, further supporting the role of the melanocortin-1 receptor gene mutation in these phenotypic associations.

06. References

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