# Anesthesia with Mitochondrial Disease

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## Background

- Mitochondrial Disease
  - Those with mitochondrial syndrome display a wide variety of symptoms; however, tissues most susceptible to mitochondrial mutations are those that require large amounts of energy
  - Organ systems commonly affected are cardiac, respiratory, central nervous, and musculoskeletal
  - Much unknown regarding the effects of anesthesia and mitochondrial function

## Case Presentation

- 23-year-old male with known mitochondrial disease within complex II and III of the electron transport chain presented with a small bowel obstruction ultimately requiring multiple surgeries.
- Depolarizing muscle relaxants were avoided in this case and the patient was induced for surgery with 100mg propofol, 50mg rocuronium, and 60mg lidocaine.
- Anesthetic was maintained with sevoflurane between 0.5% to 1.2%
- After the case he remained intubated and was admitted to the ICU with a planned second surgery two days later
- Following the second surgery the patient was initially successfully extubated after meeting acceptable spontaneous breathing parameters. Of note, prior to extubation the patient was administered a total of 120mg naloxone and 200mg sugammadex in an effort to optimize respiratory status
- After transport back to the ICU from PACU, the patient was noted to be cyanotic with SpO2 readings in the low 70's and required re-intubation.
- ABG immediately after intubating reflected acute respiratory acidosis

## Tables

| ABG immediately post intubation | |
|---|---|
| pH | 7.233 |
| CO2 | 52.7 |
| O2 | 165.4 |
| HCO3- | 22.3 |
| Base Excess | -5.7 |

| ABG 24 hours post intubation | |
|---|---|
| pH | 7.409 |
| CO2 | 32.8 |
| O2 | 113 |
| HCO3- | 23.2 |
| Base Excess | -1.2 |

## Image

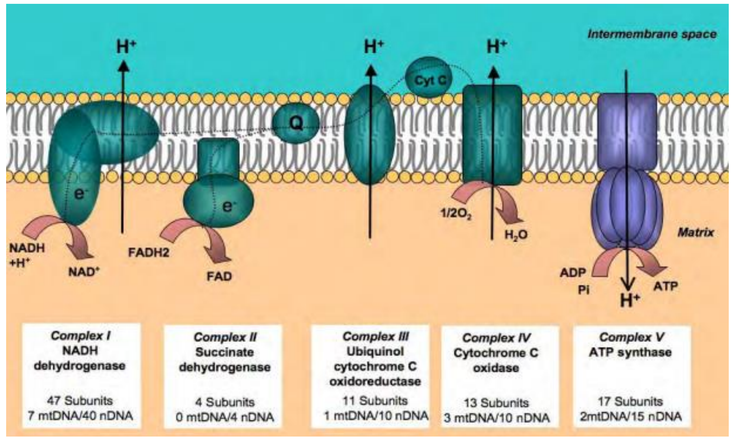


Figure 1: Electron transport chain within the inner mitochondrial membrane. The patient described in this case has deficiencies in both complex II and III.

## Discussion

- This case highlights the importance of understanding the effects of anesthetics particularly in a patient with altered physiology.
  - Intraoperatively, minimal propofol was utilized for induction to avoid any precipitation of propofol-infusion syndrome, as well as minimize cardiac and respiratory depression
  - Volatile anesthetics have a known inhibition of complex I; however, given our patient has a known complex II and III deficiency sevoflurane was utilized.
  - Narcotics and benzodiazepines should be administered judiciously to avoid postoperative respiratory depression as was noted in this case, despite the use of naloxone in attempt to mitigate residual narcotic effect.

## Conclusion

- Patients with mitochondrial disease will be prone to cardiac and respiratory depression after surgery as they have limited physiological reserve.
- Propofol, volatile anesthetics, narcotics and benzodiazepines should be administered judiciously to avoid postoperative respiratory depression

## References

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