Comparative Effects Profile: IV vs. Extended Duration Methods like Iontophoresis

Immediate Spike (IV Administration)

1. **Pharmacokinetics**
    - **Absorption**: Immediate 100% bioavailability.
    - **Half-Life**: Short, typically around 2 hours. This means that the immediate spike will be metabolized relatively quickly.
2. **Pharmacodynamics**
    - **Immediate Activation**: Rapid engagement with target enzymes and pathways, such as sirtuins and PARPs.
3. **Potential Adverse Effects**
    - **Hypotension**: Immediate risk due to rapid dilatation of blood vessels.
    - **Electrolyte Imbalance**: Rapid shifts possible, requiring immediate corrective measures.
4. **Clinical Implications**
    - **Monitoring**: Requires real-time monitoring of vitals and electrolytes.
    - **Patient Selection**: Not suitable for those with compromised cardiovascular or renal function.

Extended Duration (Iontophoresis Patch)

1. **Pharmacokinetics**
    - **Absorption**: Controlled release over 8+ hours.
    - **Half-Life**: The extended release aligns better with the short half-life, providing a more sustained level of NAD+.
2. **Pharmacodynamics**
    - **Sustained Activation**: Allows for a more prolonged engagement with target enzymes, potentially leading to more sustained therapeutic effects.
3. **Potential Adverse Effects**
    - **Hypotension**: Lower risk due to gradual release.
    - **Electrolyte Imbalance**: Less likely to cause rapid shifts, allowing for easier management.
4. **Clinical Implications**
    - **Patient Selection**: More suitable for a broader range of patients, including those with certain pre-existing conditions.

Half-Life as a Factor

- **IV**: The short half-life of NAD+ means that the immediate spike will be metabolized quickly, potentially reducing the duration of any therapeutic effects but also limiting the duration of adverse effects.
- **Iontophoresis**: The extended release over 8 hours aligns better with NAD+'s short half-life, providing a more sustained therapeutic level and potentially reducing the frequency of administration.