



Newer Modalities in Hypertension Treatment

In addition to newer antihypertensive drugs, several **innovative treatment approaches** are emerging for managing **resistant and difficult-to-control hypertension**. These include **device-based therapies, gene therapy, and advanced digital health technologies**.

1. Renal Denervation Therapy (RDN)

- **Mechanism:** Uses **radiofrequency (RF), ultrasound, or chemical ablation** to disrupt **renal sympathetic nerves**, reducing overactivity that contributes to high BP.
- **Methods:**
 - **Radiofrequency Ablation** – Delivers heat energy via a catheter.
 - **Ultrasound-Based RDN** – Uses ultrasound waves to target nerves.
 - **Alcohol-Based RDN** – Injects alcohol to destroy nerve fibers.
- **Use:**
 - **Resistant Hypertension** (when BP remains high despite multiple drugs).
- **Advantages:**
 - **Long-term BP reduction** without daily medication.
- **FDA Status:** Approved in some regions; ongoing trials for wider acceptance.

2. Baroreflex Activation Therapy (BAT)

- **Device:** "**Barostim Neo**" – A **pacemaker-like implant** that stimulates the baroreceptors in the **carotid artery**, helping to lower BP by reducing sympathetic nervous system activity.
- **Use:**
 - **Resistant hypertension** and heart failure.
- **Advantages:**
 - Improves blood pressure without affecting kidney function.
 - Helps **patients intolerant to multiple BP medications**.
- **FDA Approval:** Approved for heart failure; being studied for wider hypertension use.



3. Carotid Body Ablation

- **Mechanism:** The **carotid body**, a small structure near the carotid artery, senses oxygen levels and can drive hypertension when overactive.
 - **Treatment:** **Minimally invasive removal or deactivation** of the carotid body to lower BP.
 - **Use:**
 - **Severe resistant hypertension.**
 - **Current Status:** **Experimental**; clinical trials are ongoing.
-

4. Central Arteriovenous (AV) Fistula Therapy

- **Device:** **ROX Coupler**
 - **Mechanism:** Creates a small **AV connection between an artery and vein**, reducing BP by offloading pressure from arteries.
 - **Use:**
 - **Resistant hypertension** when medications fail.
 - **Status:** Not yet widely available; trials are ongoing.
-

5. Gene Therapy & RNA-Based Treatments (Under Research)

- **Approach:**
 - Targets **genes involved in BP regulation**, such as the **angiotensin system**.
 - **RNA-based therapies** (e.g., siRNA) to **suppress hypertension-related proteins**.
 - **Potential:** Long-term BP control with a **single treatment** instead of lifelong medication.
 - **Current Status:** **Experimental stage**; may take years for clinical use.
-

6. AI-Powered Digital Health & Smart Monitoring

- **Wearable BP Monitors:**
 - **Smartwatches & cuffs** (e.g., Apple Watch, Omron HeartGuide) track BP continuously.
- **AI-Driven Hypertension Management:**
 - Uses **machine learning** to personalize BP treatment.
 - Smartphone apps **remind patients to take meds and adjust lifestyle habits**.



HyperTensia 2025



- **Advantages:**
 - **Early detection** of BP fluctuations.
 - **Real-time BP tracking** without frequent clinic visits.

7. Gut Microbiome Therapy (Emerging Research)

- **Concept:** The gut microbiome influences **blood pressure** through **gut-derived metabolites**.
- **Potential Therapies:**
 - **Probiotics & prebiotics** to alter gut bacteria.
 - **Fecal microbiota transplantation (FMT)** (being tested in studies).
- **Status:** Still experimental but a promising area of research.

Conclusion: The Future of Hypertension Treatment

- ✓ **Device-Based Therapies** (Renal Denervation, BAT, AV Fistula) provide new hope for **drug-resistant** cases.
- ✓ **Gene Therapy & AI-Driven Care** may revolutionize **personalized treatment**.
- ✓ **Gut Microbiome Research** could introduce **novel non-drug approaches** in the future.