BIOMOD LABS · RESEARCH PEPTIDE CO.

RESEARCH COMPOUND MONOGRAPH · SERIES 1 · NO. SPR-008

# Vasoactive Intestinal Peptide (Nasal Spray Preparation)

*A single-component aqueous nasal spray preparation of the 28-residue neuropeptide Vasoactive Intestinal Peptide (VIP), originally isolated by Said and Mutt in 1970 — a full agonist at VPAC1 and VPAC2 receptors of the secretin/glucagon GPCR family, formulated for intranasal mucosal delivery via a 200-actuation metered-dose bottle at 0.10 mg active per spray.*

| CATALOG REFERENCE | FORM FACTOR | STRENGTH | DATE OF ISSUE |
|---|---|---|---|
| BM-SPR-008 | Nasal spray · 20 mg / bottle · 200 sprays · 0.10 mg per spray | 20 mg active per bottle | May 2026 |

*This research preparation is a single-component nasal spray formulation of **Vasoactive Intestinal Peptide (VIP)**, a 28-residue neuropeptide of the secretin/glucagon family originally isolated by Sami Said and Viktor Mutt at the Karolinska Institute in 1970 from porcine intestinal extracts. VIP has the sequence His-Ser-Asp-Ala-Val-Phe-Thr-Asp-Asn-Tyr-Thr-Arg-Leu-Arg-Lys-Gln-Met-Ala-Val-Lys-Lys-Tyr-Leu-Asn-Ser-Ile-Leu-Asn-$NH_2$ and acts as a full agonist at two Class B G-protein-coupled receptors, VPAC1 and VPAC2, which are widely distributed across the central nervous system, gastrointestinal tract, vascular endothelium, immune cells, and respiratory epithelium. Receptor engagement couples principally to Gαs with downstream cAMP / PKA signalling and additional Gαq coupling reported in some cellular contexts. The preparation is supplied at 20 mg total mass per bottle with 200 sprays at 0.10 mg per spray. **This monograph summarises published cellular pharmacology and preclinical findings for laboratory research reference only.***

## 01 Active Compound Profile

| | |
|---|---|
| **COMMON DESIGNATION** | Vasoactive Intestinal Peptide · VIP |
| **PRIMARY SEQUENCE (28 RESIDUES)** | His-Ser-Asp-Ala-Val-Phe-Thr-Asp-Asn-Tyr-Thr-Arg-Leu-Arg-Lys-Gln-Met-Ala-Val-Lys-Lys-Tyr-Leu-Asn-Ser-Ile-Leu-Asn-$NH_2$ |
| **C-TERMINAL MODIFICATION** | C-terminal amide; essential for receptor binding |
| **CAS REGISTRY** | 37221-79-7 |
| **MOLECULAR FORMULA** | $C_{147}H_{237}N_{43}O_{43}S$ |
| **AVERAGE MOLECULAR MASS** | 3326.78 g · $mol^{-1}$ |
| **PRIMARY MOLECULAR TARGETS** | VPAC1 and VPAC2 receptors (Class B GPCR family); additional engagement at PAC1 (the principal PACAP receptor) at higher concentrations |

## 02 Formulation and Delivery Specifications

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|---|---|
| **TOTAL MASS PER BOTTLE** | 20 mg VIP active |
| **SPRAYS PER BOTTLE** | 200 sprays |
| **ACTIVE PER SPRAY** | 0.10 mg VIP per spray |
| **VOLUME PER SPRAY** | 0.1 mL per metered actuation |
| **VEHICLE** | Aqueous nasal-grade vehicle with preservative |
| **ANALYTICAL SPECIFICATION** | ≥ 98 % purity by HPLC; content uniformity per actuation verified to ± 10 % of label claim |

## 03 Origin and Cellular Pharmacology

VIP was isolated by Sami Said and Viktor Mutt in 1970 from porcine duodenum during fractionation studies aimed at identifying gastrointestinal hormones with vasodilator activity. The molecule is the founding member of the VIP/secretin/glucagon peptide family and is now understood to function as a widely distributed neuropeptide with roles in respiratory smooth muscle relaxation, gastrointestinal motility regulation, vascular endothelial signalling, circadian rhythm regulation (through SCN VIP neurons), and immunomodulation. The two principal VIP receptors VPAC1 and VPAC2 share approximately 50% sequence identity, both couple to Gαs with downstream cAMP / PKA activation, and additionally engage Gαq / PLC / $IP_3$ pathways in some cellular contexts. VPAC1 is widely distributed

in the central nervous system, intestinal epithelium, lung tissue, T lymphocytes, and liver; VPAC2 is highly expressed in the suprachiasmatic nucleus, vascular smooth muscle, mast cells, and skeletal muscle.

## 04 Preclinical Findings

| SYSTEM | PREPARATION | REPORTED OBSERVATION | REF. |
|---|---|---|---|
| Receptor activation | VPAC1/VPAC2-transfected cell lines | Full agonism; Gαs coupling; cAMP elevation | 1 |
| Vascular smooth muscle | Isolated rabbit pulmonary artery | Endothelium-independent vasodilation | 2 |
| Circadian regulation | Mouse SCN slice preparations | Synchronisation of SCN neuronal firing rhythms via VPAC2 | 3 |
| Immunomodulation | Murine T-cell preparations | Th2-skewing; reduced TNF-α and IL-6 production | 4 |
| Respiratory smooth muscle | Isolated airway preparations | Bronchodilation via VPAC2 engagement | 5 |

## 05 Critical Chemistry-Handling Notes

### VIP-SPECIFIC HANDLING CONSIDERATIONS

VIP contains an internal Met17 residue (oxidation-susceptible) and two Tyr residues (Tyr10, Tyr22; photo-oxidation susceptible). Air-exposure minimisation and light protection are recommended. The C-terminal amide is essential for receptor binding and must be preserved. The molecule has a short plasma half-life of approximately 2 minutes in cell-free studies due to extensive peptidase cleavage; intranasal delivery bypasses some but not all of this peptidase exposure.

## 04 Nasal Delivery Considerations

### INTRANASAL BIOAVAILABILITY AND VEHICLE CHEMISTRY

The intranasal route provides direct access to systemic circulation through the rich vascularisation of the nasal mucosa, bypassing first-pass hepatic metabolism characteristic of oral administration. For peptide-class compounds, the principal nasal-delivery considerations are (a) **mucosal residence time** — aqueous nasal vehicles produce relatively short mucosal contact, with peptide permeation governed by molecular size, lipophilicity, and chemistry of the active; (b) **vehicle pH** — neutral-to-slightly-acidic pH (5.5–7.0) is optimal for both nasal mucosa tolerance and peptide bond stability; (c) **osmolarity** — formulation osmolarity is targeted to approximate physiological isotonicity to minimise mucociliary disruption; (d) **preservative selection** — benzalkonium chloride or similar quaternary ammonium preservatives are standard for nasal aqueous formulations; (e) **permeation enhancers** may be incorporated in some formulations to support peptide passage across the nasal epithelium without disrupting mucosal integrity.

## 06 Laboratory Handling and Storage

The sealed nasal spray bottle is held at 2–8 °C refrigerated for long-term storage and may be brought to room temperature for working use. Light protection is recommended; opaque or amber bottle materials provide adequate protection. Working concentrations are determined by the investigator's experimental design (0.10 mg active per actuation at the specified formulation).

## 07 References


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