CLINICAL LEARNING GUIDE

Cerebrolysin

Porcine Brain-Derived Neuropeptide Preparation | Neurotrophic / Neuroprotective Peptide Hydrolysate

Mechanisms, Evidence, and Clinical Applications

Based on lecture materials by William Seeds, MD — SSRP Institute | Cellular Medicine Education

For educational and research purposes only. Not medical advice. Cerebrolysin is NOT FDA-approved in the United States (investigational only), though it is approved in more than 40 other countries. It is given by intravenous infusion only and has no oral bioavailability. No Phase 1 human pharmacokinetic/pharmacodynamic data exist for its individual peptide fractions. All US use is off-label and investigational. Consult qualified healthcare providers before clinical use.

SECTION 1 · PROFILE OF THE PEPTIDE

Overview

Cerebrolysin is a porcine brain-derived neuropeptide preparation — a standardized peptide hydrolysate produced by the controlled enzymatic hydrolysis of lipid-free porcine brain proteins (standardized by Ever Pharma, formerly EBEWE). It is not a single molecule but a defined mixture: roughly 85% free amino acids and a roughly 15% biologically active peptide fraction, with molecular weights spanning approximately 500–10,000 Da. Mass-spectrometry profiling has identified 638 unique peptides in the preparation.

Its defining mechanistic feature is that it has nerve-growth-factor-like (NGF-like) and brain-derived-neurotrophic-factor-like (BDNF-like) bioactivity, yet contains no intact growth-factor fragments. As Dr. Seeds is careful to explain, “like” means the constituent peptides are not NGF or BDNF themselves but instead exert effects on the NGF and BDNF systems. No intact NGF, BDNF, GDNF, or CNTF fragments are detectable by mass spectrometry; the major identified protein sources are tubulin alpha/beta-chain, actin, and myelin basic protein. The practical upshot is that the neurotrophic-like activity arises from the peptide mixture collectively — Dr. Seeds’s image of “an orchestra that works together” — and attempts to isolate single fractions (or generic alternatives) fail to reproduce the biological activity.

Cerebrolysin occupies an unusual position the practitioner must hold in full. It is one of the most actively used neuropeptides in the world, approved for neurological indications in more than 40 countries and supported by a large body of preclinical mechanism and numerous clinical trials. At the same time it is not FDA-approved in the United States, has no published Phase 1 PK/PD data for its individual peptide fractions, has never been tested head-to-head against modern standards of care, and produces a notably discordant clinical evidence picture. Strong mechanism, international approval, and real-world use are not the same as proven efficacy versus contemporary therapy — and that gap is the central thing to disclose.

Peptide Profile

Property	Detail
Name	Cerebrolysin (porcine brain-derived peptide hydrolysate)
Classification	Standardized neuropeptide preparation / peptide hydrolysate; neurotrophic-like, neuroprotective agent

Property	Detail
Origin	Controlled enzymatic hydrolysis of lipid-free porcine brain proteins; standardized by Ever Pharma (EBEWE)
Composition	~85% free amino acids + ~15% biologically active peptide fraction; 638 unique peptides identified by mass spectrometry
Molecular weight	~500–10,000 Da
Bioactivity	NGF-like and BDNF-like activity from the mixture collectively; NO intact NGF/BDNF/GDNF/CNTF fragments detected
Routes	Intravenous infusion only (diluted in 100 mL normal saline, over 60–90 min); no oral bioavailability
Human PK/PD	NONE published for individual peptide fractions — no defined Cmax, t½, Vd, or clearance
Active pharmacophore	UNDEFINED — effect attributed to the 638-peptide mixture; proprietary standardization
Regulatory	NOT FDA-approved (investigational only in US); approved in >40 countries (Austria, Germany, Russia, China, South Korea)

Where Cerebrolysin Sits

Within the neuroprotection category, Cerebrolysin is the prototypical neurotrophic/neuroprotective hydrolysate — a broad, multi-target agent rather than a receptor-selective peptide. Internationally it is indicated for acute ischemic stroke, dementia (Alzheimer's and vascular), and traumatic brain injury, and in practice it is used most often as an adjunct to standard therapy for early cognitive dysfunction and neuroinflammatory processes. Its mechanism is not a single target but a coordinated nudge across several conserved neuroprotective pathways at once — neurotrophic signaling, anti-apoptosis, anti-inflammation, synaptic plasticity, antioxidant defense, and (debated) blood-brain-barrier support. As with the broad repair peptides, that breadth is both its appeal and the reason its mechanism is described as plausible but incompletely defined — here compounded by the fact that the active pharmacophore within a 638-peptide mixture remains unknown.

⚠ Cerebrolysin is NOT FDA-approved in the United States and is considered investigational here, though it is approved in more than 40 other countries. It is administered by intravenous infusion only — there is no oral bioavailability. No Phase 1 human PK/PD data exist for its individual peptide fractions, and it has never been compared head-to-head against modern standard-of-care therapies. All US use is off-label and investigational.

SECTION 2 · MODES OF ACTION AND MECHANISMS

Cerebrolysin has no single receptor or defined active pharmacophore — a critical caveat. What is known is a set of converging neuroprotective pathways, almost all demonstrated in vitro or in animal models, with a smaller set of human biomarker observations. The recurring theme is that the peptide mixture supports the brain's own repair and survival machinery: it raises neurotrophic tone, blocks apoptosis, dampens neuroinflammation, supports synaptic proteins, and buffers oxidative stress.

Neurotrophic Signaling (NGF / BDNF Systems)

In aging rat neocortex, Cerebrolysin counteracts the age-related decline in the NGF receptors TrkA and p75NTR, and it decreases proNGF expression without changing total NGF — shifting the balance from precursor toward mature, biologically active NGF. The anti-aging effect in these models is associated primarily with the NGF system rather than BDNF. In APP-transgenic Alzheimer's mice, Cerebrolysin modulates the proNGF/NGF ratio and ameliorates the cholinergic deficit through the NGF–TrkA pathway, linking neurotrophic signaling to cholinergic neurotransmission; NGF-like activity has also been shown on dorsal-root-ganglion neurons. In short, it upregulates the activity of a more mature NGF that, in turn, supports acetylcholine/cholinergic signaling.

Anti-Apoptotic Neuroprotection

Across animal models, Cerebrolysin acts on the Bcl-2/Bax axis — upregulating Bcl-2, downregulating Bax, inhibiting caspase-3, and reducing TUNEL-positive (apoptotic) cells. In a TBI model it downregulated Toll-like receptors TLR2 and TLR4, an anti-neuroinflammatory effect. Secondary thalamic findings include reduced amyloid-beta deposits and reduced BACE1 expression (BACE1 being the enzyme that cleaves toward Aβ42), reduced LC3-II conversion (an autophagy marker), and improved sensory recovery. The throughline is protection of both apoptosis and autophagy pathways in the service of neuroprotection.

Synaptic Plasticity & Anti-Inflammatory Effects

Cerebrolysin enhances the synaptogenic protein LRRTM4 in the hippocampus of aged rats — a protein specifically expressed at hippocampal synapses — and attenuates the age-related decline in learning and memory, with improved behavioral performance in APP-transgenic mice. On the inflammatory side it reduces microglial activation in vivo and in vitro (described as "neuroimmunotrophic" activity), downregulates TLR2/TLR4 in TBI models, and reduces NF-κB pathway signaling in vitro. The combination of increased synaptic plasticity and reduced microglial activation is a central part of its proposed benefit in early cognitive and neuroinflammatory conditions.

Supporting Mechanisms: Blood-Brain Barrier & Oxidative Stress

In vitro, Cerebrolysin reverses tPA/fibrin-induced blood-brain-barrier permeability, restores the tight-junction proteins ZO-1, occludin, and claudin, and reduces inflammatory mediators (ICAM-1, a leukocyte-adhesion molecule; HMGB1, a damage-associated molecular pattern; TNF-α; and phospho-NF-κB-p65). It also upregulates the BBB GLUT1 glucose transporter in animal cortex. Crucially, Dr. Seeds flags this as contested: a cerebroprotein hydrolysate failed to replicate the BBB effects, so while the neuroprotective and anti-inflammatory actions on neurons are reasonably supported, the full set of specific BBB claims remains up for debate and needs further validation. On the antioxidant side, animal studies show upregulation of superoxide dismutase (SOD) and glutathione peroxidase (GPx), enhanced total antioxidant capacity, and reduced malondialdehyde (MDA, a lipid-peroxidation marker). Whether the Nrf2 pathway is responsible cannot be confirmed from the verified citations.

Supporting Mechanisms: Neurogenesis & Amyloid/Tau

In APP-transgenic mice, Cerebrolysin enhanced the survival of grafted neural stem cells, reduced caspase-3 and TUNEL positivity in those cells, and increased BDNF and furin immunoreactivity — supporting neuroblast survival without forcing differentiation (keeping stem cells in a quiescent state, ready to proliferate and differentiate, while improving survival). On amyloid/tau, it reduced Aβ deposits and BACE1 in a stroke model, and — in the first human biomarker study — reduced neuronal-derived extracellular-vesicle (NDEV) total tau, P-T181-tau,

and P-S396-tau; combination with donepezil further reduced NDEV Aβ42 versus either monotherapy, and NDEV Aβ42 and P-T181-tau correlated inversely with serum BDNF. Dr. Seeds notes openly that one tau-model paper (Rockenstein 2015) was retracted in 2025, underscoring that the mechanistic literature is rich but still needs better definition.

> **Key mechanistic point: Cerebrolysin has no single receptor and no defined active pharmacophore. Its 638-peptide mixture acts as a coordinated "orchestra," converging on conserved neuroprotective pathways — NGF/BDNF-like neurotrophic signaling and cholinergic rescue, Bcl-2/Bax anti-apoptosis, microglial/TLR/NF-κB anti-inflammation, LRRTM4 synaptic plasticity, SOD/GPx antioxidant defense, and (debated) blood-brain-barrier support. The mechanism is broad and plausible and partly supported by human biomarkers, but is largely preclinical, and the specific active fraction(s) remain unknown.**

A Note on the "Orchestra" and Generic Substitutes

Because the bioactivity emerges from the peptide mixture collectively, Dr. Seeds stresses that Cerebrolysin cannot be reduced to a single fraction and that generic alternatives lack comparable biological activity. This is mechanistically important — it explains both why the preparation is proprietary and standardized, and why the field has been unable to name the responsible pharmacophore. It also frames the central scientific task ahead: further delineation of which peptides and proteins in this porcine-brain mixture actually drive the observed effects.

SECTION 3 · POINTS OF CLINICAL RELEVANCE

- **The defining tension.** Widely used and internationally approved — yet without modern comparator trials or human PK/PD.

This is the most important framing for any conversation about Cerebrolysin. It is one of the most actively used neuropeptides in the world, approved in more than 40 countries, with a large preclinical mechanism base and many clinical trials. But there are no Phase 1 pharmacokinetic/pharmacodynamic studies of its individual peptide fractions, and no modern head-to-head trials against the current standards of care (tPA/thrombectomy for stroke, anti-amyloid antibodies for Alzheimer's). International approval and heavy real-world use are not the same as proven benefit versus contemporary therapy.

- **Discordant stroke evidence.** The single hardest thing to reconcile is conflicting stroke data.

The large, double-blind CASTA trial (n=1,070) was neutral on its primary global endpoint, though a severe-stroke subgroup (NIHSS >12) trended in favor of Cerebrolysin with a mortality signal (90-day mortality ~20% placebo vs ~10% Cerebrolysin). The CARS meta-analysis showed a positive upper-extremity motor-recovery signal, while a Cochrane review raised a concern about non-fatal serious adverse events. Positive motor recovery, neutral global outcome, and an SAE concern coexist in the same literature — the practitioner needs to know exactly where each finding sits.

- **Modest but real AD cognitive benefit.** The Alzheimer's signal is consistent but small.

A 28-week RCT reported a 3.2-point ADAS-cog benefit ($p<0.0001$) and a 63.5% vs 41.4% CGI responder rate, with benefit sustained months after treatment. Dose-finding work showed global improvement at 10, 30, and 60 mL, with a reversed-U dose-response in which the 10 mL dose performed best for cognition. Cerebrolysin performed comparably to donepezil and was numerically best in combination — a neurotrophic-plus-cholinergic synergy.

- **Favorable TBI neurorecovery.** The traumatic-brain-injury data are among the more encouraging.

The CAPTAIN meta-analysis (n=185) reported an odds ratio of 1.77 at Day 90 (p=0.0146), with large effect sizes on specific cognitive tests, and a broader systematic review (5 studies, n=5,685) showed small-to-moderate benefits on GOS and mRS. The major caveat is high statistical heterogeneity (I^2 ~88–90%) across the systematic review, which limits firm conclusions.

- **The active ingredient is undefined.** Benefit is attributed to a 638-peptide mixture, not a known molecule.

There is no identified active pharmacophore, no human PK/PD for individual fractions, and a proprietary standardization process. This is a real limitation when weighing evidence and dosing, and it is why generic substitutes do not reproduce the activity.

- **Industry-funding caveat.** Most multicenter trials were sponsored by the manufacturer.

The bulk of the larger Cerebrolysin trials were funded by EBEWE/Ever Pharma, and the Cochrane review explicitly flagged industry bias — particularly around the internationally accepted vascular-dementia indication, where independent replication is limited. This does not make the findings wrong, but it is a disclosure-worthy limitation.

- **Best understood as an adjunct.** In practice it complements, rather than replaces, standard care.

Dr. Seeds's read is that most clinicians use Cerebrolysin as an adjunct to standard therapy, with the clearest real-world utility in early cognitive dysfunction and neuroinflammatory processes, and in post-stroke motor and TBI neurorecovery — always by supervised IV infusion.

SECTION 4 · GENERAL DOSING INSTRUCTIONS AND DELIVERY OPTIONS

> **Cerebrolysin is given by INTRAVENOUS infusion ONLY — there is no oral bioavailability. There are NO human PK/PD data for its individual peptide fractions, so dose optimization is empirical, not pharmacokinetically guided. It is NOT FDA-approved in the US. All doses below are drawn from international RCT protocols or clinical-practice convention, not from US-approved labeling.**

Dosing Protocols Drawn from RCTs

Indication	Dose (IV)	Duration	Timing / Source
Acute stroke (CASTA)	30 mL/day	10 days	Within 12 h of onset
Stroke rehab (CARS)	30 mL/day	21 days	Within 24–72 h
AD (mild–moderate)	30 mL, 5 d/wk × 4 wk	28-wk cyclical	Outpatient; repeat after washout
AD (dose-finding)	10, 30, or 60 mL	12 wk active	Reversed-U; 10 mL best for cognition
TBI (mod–severe, CAPTAIN)	50 mL ×10 d, then 10 mL cycles	~30 days	Early post-injury
Mild TBI	30 mL/day	5 days	Within 24 h

All protocols: IV infusion diluted in 100 mL normal saline, run over 60–90 minutes. No oral bioavailability. No human PK/PD for individual fractions.

Administration & Cycling (Convention, Not Approved Labeling)

- Established RCT starting points: ~30 mL/day for Alzheimer's and stroke; ~50 mL/day for moderate-to-severe TBI. The higher 30–50 mL doses are reserved for those specific indications.
- In practice, the most commonly prescribed IV dose is lower — often around 10 mL (and ranging roughly 5–10 mL, occasionally as low as 1 mL or up to 15–20–30 mL) — reflecting the reversed-U dose-response in which 10 mL was best for AD cognition.
- Cyclical dosing is common for cognitive indications: e.g., three times weekly for 4–6 weeks, or 5 of 7 days for 4–6 weeks, then cycling, with benefit described as building over time.
- IV infusion in a supervised clinical setting is the standard route; short courses (roughly 5–21 days) are used acutely, with longer cyclical courses for cognitive use.
- Document a baseline cognitive/memory workup before starting and track response across cycles; follow CBC and renal function (and hepatic function, though no LFT changes have been observed) given the large peptide/amino-acid load.

Combinations Seen in Practice (Rationale Only)

Cerebrolysin is most notably paired with donepezil in Alzheimer's, where the combination produced the best cognitive outcomes and the largest NDEV Aβ42 reduction (a neurotrophic-plus-cholinergic synergy), and it is reported safe alongside donepezil and rivastigmine. With tPA, it reverses tPA-induced BBB permeability in vitro. It has not been compared with anti-amyloid monoclonal antibodies (lecanemab, donanemab). These pairings are mechanistic rationale, not validated head-to-head protocols.

SECTION 5 · EVIDENCE PROFILE

Clinical Evidence by Indication

Indication / Trial	Key Finding	Evidence Tier
Stroke — CASTA (n=1,070)	Neutral primary endpoint; severe-stroke subgroup trended favorable with mortality benefit (~20% vs ~10%)	RCT — NEUTRAL
Stroke — CARS meta (N=442)	Positive upper-extremity motor recovery (ARAT Day 90; NNT 7.1 for NIHSS)	Meta-analysis
Stroke — Gharagozli (N=100)	NIHSS and mRS improvement at Day 30	RCT
Stroke — Cochrane (7 RCTs)	All-cause death RR 0.90 (NS); non-fatal SAE concern (RR 2.15)	Systematic review
AD — 28-wk RCT (n=149)	ADAS-cog +3.2 pts; CGI responder 63.5% vs 41.4%; sustained at Wk 28	RCT
AD — dose-finding	Global improvement at 10/30/60 mL; reversed-U (10 mL best for cognition)	RCT

Indication / Trial	Key Finding	Evidence Tier
AD — combo + biomarkers	= donepezil; combo numerically best; reduces NDEV tau, P-tau, Aβ42	RCT / biomarker
TBI — CAPTAIN meta (n=185)	OR 1.77 at Day 90 (p=0.0146); large effects on specific cognitive tests	Meta-analysis
TBI — systematic review	GOS SMD 0.30; mRS SMD −0.29; high heterogeneity (I^2 88–90%)	Meta-analysis
Hemorrhagic stroke (n=96)	No significant group effect; safe and well tolerated	RCT — NEUTRAL
Vascular dementia	Internationally approved; Cochrane flagged industry bias; limited independent replication	Review

Mechanistic Checklist (Confirmed vs Unconfirmed)

Mechanistic Axis	Status	Evidence Tier / Gap
Neurotrophic signaling (NGF/BDNF-like)	Confirmed	Preclinical + in vitro
Anti-apoptotic (Bcl-2/Bax, caspase-3)	Confirmed	Animal
Anti-inflammatory (microglial/TLR/NF-κB)	Confirmed	Animal + in vitro
Synaptic plasticity (LRRTM4)	Confirmed	Animal
Oxidative stress (SOD/GPx)	Confirmed	Animal (Nrf2 unconfirmed)
Cholinergic rescue	Confirmed	Animal + clinical
Amyloid/tau modulation	Confirmed	Clinical biomarker (2022)
Disease modification	Unconfirmed	No disease-modification trial design

“Confirmed” here means documented in peer-reviewed literature. It does NOT equal human clinical proof of benefit versus standard of care.

What Can and Cannot Be Confirmed

Can confirm	Cannot confirm
638-peptide composition; NGF/BDNF-like activity	Any single active pharmacophore or fraction
Preclinical neurotrophic / anti-apoptotic / anti-inflammatory mechanisms	Human PK/PD (no Cmax, t½, Vd, clearance)
Modest AD cognitive benefit; positive stroke motor recovery; favorable TBI signal	Benefit versus modern standard of care (no head-to-head RCTs)
Human biomarker effects on NDEV tau/Aβ42 (2022)	Disease modification (sustained benefit ≠ disease modification)
Generally placebo-comparable safety across 12 RCTs	Long-term safety (max follow-up ~28 wk AD, ~90 d stroke)

Critical Evidence Gaps

- No Phase 1 PK/PD: no Cmax, t½, Vd, or clearance for the individual peptide fractions.
- No modern comparator RCTs versus tPA/thrombectomy (stroke) or anti-amyloid monoclonal antibodies (AD).
- Disease modification unconfirmed — no delayed-start or randomized-withdrawal trial design.
- Long-term safety uncharacterized (maximum follow-up ~28 weeks in AD, ~90 days in stroke).
- Discordant stroke evidence: positive CARS motor recovery vs neutral CASTA global outcome vs Cochrane SAE concern.
- Industry bias: most multicenter trials were funded by EBEWE/Ever Pharma.
- Active pharmacophore(s) undefined within a 638-peptide mixture with proprietary standardization.

SECTION 6 · CLINICAL CONSIDERATIONS

Regulatory & Legal Status

Cerebrolysin is not FDA-approved in the United States and is regarded as investigational here; in the US, any use is off-label and investigational. Internationally it is a different picture: it is approved in more than 40 countries (including Austria, Germany, Russia, China, and South Korea) for acute ischemic stroke, dementia (Alzheimer's and vascular), and traumatic brain injury. The preparation is proprietary and standardized by Ever Pharma, and because its bioactivity depends on the intact 638-peptide mixture, generic substitutes are not equivalent.

Safety Profile

Reported adverse effects are generally mild and transient: vertigo/dizziness, infusion-site reactions, agitation, and sweating/warmth. A safety meta-analysis of 12 RCTs (2,202 patients) found no significant safety signal versus placebo (AE rates ~38–43% Cerebrolysin vs ~38–41% placebo), with the 50 mL dose associated with a moderate reduction in serious adverse events (RR 0.60). Against this, the Cochrane review raised a discordant concern about non-fatal serious adverse events (RR 2.15 overall; RR 2.86 in a 30 mL × 10-day subgroup) on moderate-quality evidence. Dr. Seeds notes the conflicting safety reads while emphasizing that Cerebrolysin remains one of the most actively used neuropeptides worldwide.

Contraindications & Cautions

- Epilepsy / seizure disorders: caution warranted, particularly at higher doses; EEG monitoring advisable in patients with a seizure history.
- Renal impairment: risk of peptide/amino-acid accumulation given the large nitrogen load — monitor renal function before and during treatment.
- Porcine allergy: theoretical immunogenicity; anaphylaxis is extremely rare but possible — identify porcine sensitivity beforehand.
- Pregnancy and lactation: contraindicated — no safety data.

Note: no dedicated primary studies were identified for seizure risk, renal-impairment PK, or immunogenicity — these cautions are prudential and warrant manual verification.

Monitoring

Reasonable monitoring follows RCT practice: vital signs during the 60–90-minute IV infusion; baseline and periodic renal function (because of amino-acid/peptide accumulation risk); hepatic function (no LFT changes have been observed, but worth tracking); and indication-appropriate neurological assessment (NIHSS for stroke, ADAS-cog or a cognitive/memory workup for dementia). For cognitive use, Dr. Seeds recommends a baseline cognitive workup and structured follow-up across dosing cycles, contributing to the evolving evidence base.

Patient Selection & Practitioner Posture

In practice, Cerebrolysin is used — most often as an adjunct — for early cognitive dysfunction and neuroinflammatory processes, post-stroke motor rehabilitation (within ~72 hours), and moderate-to-severe TBI neurorecovery, all by supervised IV infusion. The responsible posture mirrors the evidence: present the robust preclinical mechanism, the modest-but-real clinical signals, and the international approval honestly alongside the absence of US approval, the lack of human PK/PD and modern comparator trials, the discordant stroke and safety data, and the industry-funding caveat. Obtain full informed consent, treat in a supervised setting, use only the standardized preparation, and keep careful clinical notes so outcomes can be tracked.

SECTION 7 · A FINAL NOTE

Cerebrolysin is one of the most mechanistically interesting agents in the neuroprotection group and one of the most widely used neuropeptides in the world — yet it is also one of the hardest to pin down. It is a standardized porcine-brain peptide hydrolysate whose 638-peptide "orchestra" produces NGF- and BDNF-like activity without any intact growth-factor fragments. Its preclinical story is broad and coherent: it raises neurotrophic tone and rescues cholinergic signaling, blocks apoptosis (Bcl-2/Bax, caspase-3), dampens microglial and TLR/NF-κB-driven neuroinflammation, supports the synaptic protein LRRTM4, buffers oxidative stress (SOD/GPx), and — in the first human biomarker work — lowers NDEV tau and amyloid measures, especially in combination with donepezil.

And yet the honest accounting is sobering. There are no Phase 1 PK/PD data for its individual fractions, no defined active pharmacophore, and no modern head-to-head trials against tPA/thrombectomy or anti-amyloid antibodies. The clinical signals are real but modest and, in stroke, openly discordant — a neutral CASTA primary endpoint, a positive CARS motor-recovery signal, and a Cochrane serious-adverse-event concern coexisting in the same literature. Most large trials were industry-funded, disease modification is unconfirmed, long-term safety is uncharacterized, and the agent is not FDA-approved in the United States. One mechanistic paper was retracted in 2025, a reminder that the literature is still being sorted.

For the practitioner, the posture follows from that tension. Cerebrolysin's mechanism is plausible and its real-world use — most often as an adjunct for early cognitive dysfunction, neuroinflammation, and post-stroke/TBI neurorecovery — is substantial, but plausibility and popularity are not proof of benefit versus modern care. Used thoughtfully — by supervised IV infusion, with the standardized preparation, conservative empirical dosing (commonly ~10 mL, cycled), full informed consent that names the gaps plainly, and careful documentation of cognitive and functional outcomes — each patient becomes a data point in the evidence base this peptide still needs.

> **Bottom line: Cerebrolysin is a standardized porcine-brain peptide hydrolysate (638 peptides; NGF/BDNF-like activity, no intact growth-factor fragments) with broad, coherent preclinical neuroprotective mechanisms and human biomarker support, plus modest clinical signals — a ~3.2-pt ADAS-cog AD benefit, positive stroke motor recovery (CARS), and favorable TBI neurorecovery (CAPTAIN OR 1.77). But it has no human PK/PD, no**

defined active fraction, no modern comparator RCTs, discordant stroke/safety data, and heavy industry funding. It is IV-only, generally placebo-comparable on safety, and NOT FDA-approved in the US (approved in >40 countries). Mechanistically rich and widely used — best positioned as a supervised adjunct, not a proven stand-alone therapy.

Selected References & Source Note

This guide was prepared from the recorded SSRP lecture on Cerebrolysin by William Seeds, MD, and the accompanying slide deck. The 35 references below are reproduced from the lecture's bibliography; readers should consult the primary sources directly. Note Dr. Seeds's caveat that one cited paper (reference 14, Rockenstein 2015 tau model) was retracted in 2025.

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