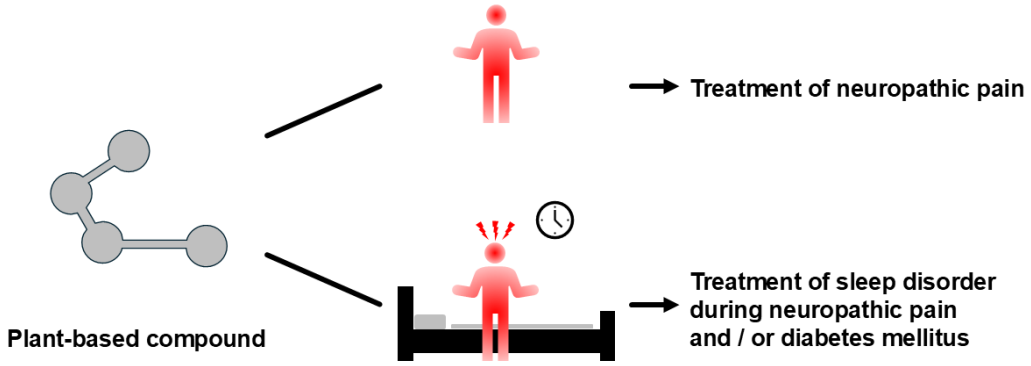
First Plant-Based Dual-Action Candidate

A Plant-based Compound for Neuropathic Pain Relief and Restorative Sleep

Invention

Neuropathic pain affects 7-10 % of the population and is particularly prevalent in diabetes. While standard analgesics (e.g., NSAIDs) lack efficacy, guidelines instead recommend antiepileptics and antidepressants, which reduce pain only partially and carry notable side effects. Neuropathy-related sleep disturbances further erode quality of life and remain insufficiently treated.
Thus, patients with peripheral and diabetic polyneuropathy require better-tolerated, dual-acting therapies that both relieve neuropathic pain and improve sleep. Inventors from the Heinrich Heine University Düsseldorf disclose a plant-based compound as a novel and active ingredient for preventing and treating neuropathic pain (diagnosis: ICD-11 8E43.0) and neuropathy-related sleep-wake disorders (diagnosis: ICD-11 7) in validated mouse models of painful neuropathy. Mechanistic in-vitro profiling shows potent engagement of the Kappa-Opioid-receptor (KOR) and Serotonin-Transporter (SERT) with limited off-target activity (low hERG signal), offering a plausible dual analgesic–sedative rationale aligned with clinical standards for neuropathic pain management.



The plant-based compound demonstrates dual efficacy in preclinical models, relieving neuropathic pain and improving sleep disturbances associated with neuropathy and diabetes.

Commercial Opportunities

On behalf of the Heinrich Heine University Düsseldorf, PROvendis offers an access to rights for the plant-based compound, its medical indication and the commercial use of this invention.

Current Status

In three neuropathy mouse models (1. surgically induced Spared Nerve Injury (SNI); 2. Streptozotocin-Induced Diabetic models (STZ-diabetic); 3. spontaneously obese and diabetic mouse model (db/db type-2 diabetic)), the single-dose plant-based compound (2.5 mg/kg, i.p.) produced robust analgesia with a more than 50 % reduction of mechanical allodynia in SNI mice and in STZ-diabetic mice on both paws, including experiments randomized/blinded. At the same dose, the compound showed sedation despite pain yet no motor-coordination deficit on RotaRod. In the db/db type-2 diabetic model, sedation was stronger than in controls and sleep was improved with a sleep latency of less than 25 % and a sleep duration of up to 88 % vs. vehicle, outperforming diazepam in db/db mice. Mechanistically, in a 44-target in-vitro screen, the compound selectively engaged KOR and SERT (binding inhibition 68.5 % and 66.4 % at 10 µM, respectively) with low hERG liability (~15.4 %); activity at KOR/SERT remained detectable at 1 µM.

Intellectual Properties

A European Patent Application has been filed on November 10th, 2025.

Advantages

- Dual therapeutic benefit: Analgesia and sleep improvement
- No motor-coordination deficit at effective doses
- Favorable safety signals by low hERG activity

Technology Readiness Level

1 2 3 **4** 5 6 7 8 9

Technology validated in lab

Sector(s)

- Pharmacy

Ref.-No.

7696

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An invention from the Heinrich Heine University Düsseldorf.

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