

Treatment of ZIP9-associated diseases with tetrapeptides

Osteoporosis, osteopathy, muscle atrophy, myopathy, amyotrophy, infertility

DESCRIPTION OF TECHNOLOGY

Osteoporosis, myodegenerative diseases and male infertility are generally treated - depending on the cause of the illness - e.g. by administering testosterone or testosterone derivatives. This type of treatment also involves the classic nuclear androgen receptor (AR), resulting in a variety of unwanted side effects



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caused by the hormonal activity (e.g. hirsutism, virilisation, high blood pressure, reduction in sperm count and much more).

These as well as other diseases are based on malfunctions of somatic cells which (also) possess the ZIP9 receptor (osteoblasts, myoblasts, Sertoli cells, etc.), a membrane-bound testosterone receptor of

physiological and pathophysiological significance. Agents binding to this receptor can therefore be expected, unlike testosterone or testosterone derivatives, not to cause any of the AR-mediated side effects mentioned above.

In search for active substances corresponding to ZIP-9 at the Justus-Liebig-Universität, tetrapeptides were identified by means of molecular theory-calculations that bind to the ZIP9 receptor, and their effects upon cells bearing this receptor were investigated experimentally. During these investigations, therapeutic effects were found.

AT A GLANCE ...

Application Field

- Osteoporosis
- Myodegenerative diseases, Male infertility

Business

- Pharmacy
- Medical science

USP

- Avoiding the side effects associated with testosterone
- Easy production and high storage stability compared to peptide hormone therapeutics

Development Status

- Efficacy successfully proven on laboratory scale

Patent Status

Priority application, filed 23.11.2020 at the European Patent Office.

REFERENCE NO.: **TM 1095**

APPLICATION FIELDS

Fields of application of the tetrapeptides, e.g. tetrapeptide "isoleucine-alanine-proline-glycine", are the treatment of various diseases in which ZIP9-expressing cells are involved, e.g. osteoporosis and muscle atrophy as well as other diseases.

ADVANTAGES OVER PRIOR ART

Since the designed tetrapeptides only bind to the ZIP9-receptor, and not to the androgen-receptor (AR), they do not exhibit the unwanted androgenic side effects associated with the application of testosterone.

Moreover, they are also easier to produce and more stable in storage than, for example, peptide hormones such as parathormone, another active ingredient used in the treatment of osteoporosis.

STATE OF PRODUCT DEVELOPMENT

Laboratory experiments show cell culture-based evidence of efficacy in various cell lines, e.g. in SAOS-2 osteoblasts (effect against osteoporosis), in L6 myoblasts (effect against muscle degeneration) and in Sertoli cells (effect against infertility).

MARKET POTENTIAL

Already the market volume of therapeutics against osteoporosis and against myopathies is quite considerable. Since further therapeutic effects can be expected, including effects that have not yet been investigated (as a result of the widespread occurrence of the ZIP9-receptor in a broad variety of cell types), generally a high market potential for such active substances can be assumed.

COOPERATION OPPORTUNITIES

On behalf of its shareholder Justus-Liebig-University Giessen TransMIT GmbH is looking for cooperation partners or licensees for distribution or further development in Germany, Europe, US, and Asia.

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