

GSTP1 - A NOVEL APPROACH FOR PREVENTION AND TREATMENT OF HEART FAILURE

SUMMARY

Glutathione S-transferase P1 (GSTP1), applied as a recombinant protein, shows powerful longterm cardioprotective effects in a rat model for myocardial infarction after a single application within 2 hours after infarction.

REFERENCE:

257.09

AVAILABLE FOR:

- License Agreement
- Assignment

KEYWORDS:

biological therapeutic,
myocardial infarction,
cardiomyopathy

APPLICATION:

treatment and prevention of
cardiomyopathies, especially
myocardial infarction

DEVELOPMENT STATUS:

in vivo proof of concept,
extensive *in vitro* data

PATENTS:

WO2011050379
US8758745 B2
US9375460 B2
EP2493496 B
JP5863660 B2
CN102573892 B
IN 3340/DELNP/2012

BACKGROUND



Coronary heart disease is the leading cause of mortality in the world. Although there are various treatment options on the market, including generics as well as novel first-in-class molecules, all of them are only moderately successful and none of them are able to restore cardiomyocytes. Despite all efforts, the thirty-day mortality of myocardial infarction patients is still high with about 4-6%. Furthermore, in terms of efficacy and safety there are significant unmet needs in the currently underserved myocardial infarction therapeutics market. As

outlined below, the recombinant protein Glutathione S-transferase P1 (GSTP1) combines a favorable safety profile with the ability to rescue cardiomyocytes post myocardial infarction.

BENEFITS

- GSTP1 has a potent cardio-protective effect after a single dose systemic administration within the first two hours after the myocardial infarction event
- GSTP1 restores cardiomyocytes and prevents myocardial infarction induced heart failure
- GSTP1 improves long-term cardiac function: GSTP1 treated rats had a significantly higher cardiac index, cardiac output, stroke volume, and ejection fraction than the untreated control animals and displayed NO infarct related wall thickening
- GSTP1 is a natural protein occurring normally in humans. Thus, no antibody response or risk for the development of allergies is expected
- GSTP1 has anti-inflammatory effects
- GSTP1 is available as recombinant protein

TECHNOLOGY

Following myocardial infarction, many cardiomyocytes (heart muscle cells) die within a very short time through a process called necrosis. However, the major part of the cardiomyocytes does not undergo necrosis but rather apoptosis (programmed cell death) due to activated inflammatory processes occurring within the days after the infarction event. These cardiomyocytes can be saved with a single injection of recombinant GSTP1 (Fig. 2).

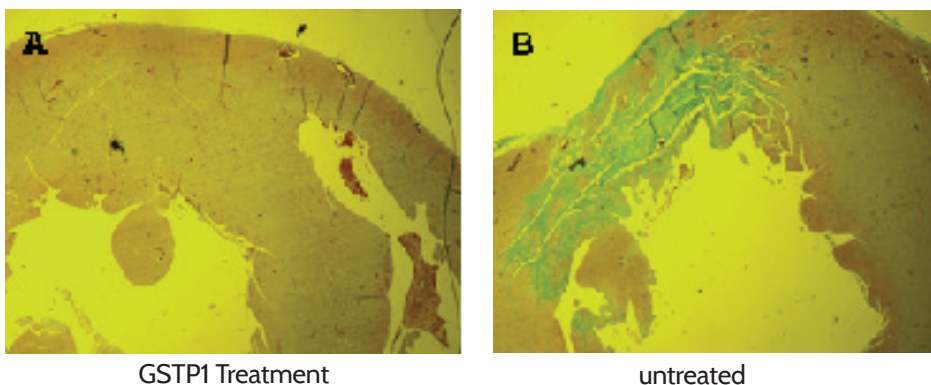


Fig. 2 Representative, histological section of a rat heart after infarction and treatment with GSTP1 (Fig. 2(A)) or treatment with control Ringer solution (Fig. 2(B)), where the scar is clearly visible (blue). Myocardial infarction, was induced in 40 rats. Within 2 hours after the event 20 animals were treated by a single intraperitoneal administration of GSTP1, while the 20 control animals received Ringer solution. Ten animals of each group were sacrificed 24 hours thereafter. The remainder of the animals was sacrificed after 3 weeks (Fig.2).

Rats treated with GSTP1 early after myocardial infarction displayed a dramatically better condition of the myocard compared to control animals. Electrocardiogram and numerous molecular biological markers revealed a significant improvement of cardiac function in the GSTP1 group. Furthermore, the histological data showed a dramatic reduction in scar formation and myocardial thinning (Fig. 1). GSTP1 is involved in multiple cellular functions, including phase II metabolism, stress response, signaling, apoptosis, and - as outlined here for the first time - in the restoration of cardiomyocytes after myocardial infarction.

FURTHER READING

- Andrukhova et al., 2012: Serum Glutathione S-Transferase P1 in Prediction of Cardiac Function. *J Card Fail.* 2012 March; 18(3): 253-261.
- Andrukhova et al., (2013): Single Dose Glutathione S-Transferase P1 prevents infarction-induced heart failure. *J Card Fail.* 2014 Feb; 20(2):135-45.

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