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Empowering Ideas

Biologic therapy, cachexia, muscular dystrophy, acute musculoskeletal injury

High Potency Recombinant IGF-1 Biologic

Optimized IGF-1 isoforms have been developed with improved potency in producing muscle hypertrophy.

Inventor
Elisabeth Barton

STATE OF DEVELOPMENT

- Proof of concept in myoblasts and preclinical animal model (mice)
- Cell based production and purification initiated

INTELLECTUAL PROPERTY

U.S. Patent Appln. No. 14/584,481

REFERENCE MEDIA

Brisson B.K. and **E.R. Barton.** (2012) *PLoS One*. 7(9):e45588.

Durzynska, J., A. et al. (2013) *Endocrinology*. 154(3):1215-24. PMCID: PMC3578996.

Brisson, B.K., et al. (2014) *Am. J. Physiol. Endo*, 306(8):E965-74. PMCID: PMC3989742.

DESIRED PARTNERSHIPS

- License
- Co-Development

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Problem

Insulin-like growth factor I (IGF-I) is a key regulator of muscle development and growth. However, the complexity of IGF-1 activity is modulated by extensive alternative splicing and glycosylation.

Solution

A former Penn researcher, Dr. Elisabeth Barton, generated new forms of recombinant IGF-I (rIGF-1). In contrast to the work that has focused on the independent actions of the C-terminal E-peptide of IGF-I, which have modest activity, require the IGF-I receptor, and can be detrimental to muscle strength, the new IGF-I forms include both the mature IGF-I protein and the E-peptide as a single protein. Further, the sites for glycosylation have also been eliminated, affording the production of a single and potent proIGF-I form.

The pro IGF-1 form is more potent and demonstrates enhanced IGF-1R activation both *in vitro* and *in vivo*. In recent *in vivo* experiments pro-IGF-I enhanced the immediate effect on muscle hypertrophy causing more than twice the increase in muscle mass than either mature IGF-I or IGF-IA at 1 week post-injection. The increased potency means that lower protein levels are needed for the same benefit. In studies to determine the minimum effective dose, it was found that a 3-fold lower level of pro-IGF-I production compared to mature IGF-I is sufficient to produce an equivalent hypertrophic response in muscle.

Advantages

- Increased potency of novel isoforms compared to current rIGF-1 or pegylated IGF-1
- Novel isoforms are more stable than current rIGF-1
- Potential for reduced dosing and reduction in side effects