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# **Amarantus Subsidiary MANF Therapeutics Announces Publication in Science Magazine of Positive Animal Data for MANF in Treatment of Retinal Damage and Issuance of Retinal Patent in Japan Covering MANF and CDNF**

- Data demonstrates MANF's role in modulating the immune microenvironment in the retina and its potential for treating retinal disorders
- Patent extends MANF Therapeutics' exclusivity for MANF and CDNF treatment of retinal disorders in Japan into 2031

SAN FRANCISCO, Dec. 14, 2017 (GLOBE NEWSWIRE) -- [Amarantus Bioscience Holdings, Inc.](#) (OTCPK:AMBS), a US-based biotechnology holding company with wholly-owned subsidiaries developing first-in-class orphan neurologic, regenerative medicine and ophthalmic therapies, today announced the publication of positive pre-clinical data for mesencephalic astrocyte-derived neurotrophic factor (MANF) in the treatment of retinal damage in the prestigious peer-reviewed scientific journal Science Magazine. In addition, Amaranthus' wholly-owned subsidiary MANF Therapeutics, Inc. was issued a patent by the Japan Patent Office entitled "Method of Treatment for Retinal Disorders" covering the use of MANF and cerebral dopamine neurotrophic factor (CDNF) as treatments for retinal disorders, including Retinitis Pigmentosa (RP) and Glaucoma. The issued patent extends coverage for MANF Therapeutics use of MANF and CDNF in the treatment of retinal disorders in Japan into 2031.

The data published in Science demonstrated a strong protective effect of MANF on retinal cells and on retinal function in animal models of retinal damage. It was determined that the effect was driven by MANF's capacity to activate and modulate the retinal immune microenvironment, and specifically its role in mediating retinal damage. The key findings from the publication include:

- Hemocyte-derived MANF is activated downstream of Pvf-1/PvR paracrine signaling to promote retinal repair in *Drosophila*;
- MANF has immune modulatory properties that are required for retinal repair in *Drosophila*;
- Damage response associated PDGF-A/MANF paracrine signaling is conserved in mammals;
- MANF has a conserved neuroprotective function in the mammalian retina;
- MANF-dependent modulation of immune cell phenotypes mediates retinal protection;

- MANF promotes cell integration and restoration of visual function in the mammalian retina.

"The publication of this fundamental data adding to the wealth of information describing MANF's critical importance in the improvement of cellular function underscores the potential applications of the technology being developed by MANF Therapeutics," said Gerald E. Commissiong, Amaranthus' President & CEO. "MANF's potential to treat retinal disorders with this new mechanism of action brings hope to those suffering from retinal disorders, including retinitis pigmentosa and glaucoma. MANF Therapeutics is preparing to launch operations in 2018 for the purpose of re-initiating IND-enabling development towards first-in-man studies in an orphan ophthalmic indication."

A link to the abstract is available here:

<http://science.sciencemag.org/content/353/6294/aaf3646>.

### **About Amaranthus Bioscience Holdings, Inc.**

Amarantus Bioscience Holdings ([AMBS](#)) is a biotechnology company developing treatments and diagnostics for diseases in the areas of neurology, regenerative medicine and orphan diseases through its subsidiaries. AMBS' wholly-owned subsidiary Elto Pharma, Inc. has development rights to eltoprazine, a Phase 2b-ready small molecule indicated for Parkinson's disease levodopa-induced dyskinesia, Alzheimer's aggression and adult ADHD. AMBS acquired the rights to the Engineered Skin Substitute program (ESS), a regenerative medicine-based approach for treating severe burns with full-thickness autologous skin grown in tissue culture that is being pursued by AMBS' wholly-owned subsidiary Cutanogen Corporation. AMBS' wholly-owned subsidiary MANF Therapeutics, Inc. owns key intellectual property rights and licenses from a number of prominent universities related to the development of the therapeutic protein known as mesencephalic astrocyte-derived neurotrophic factor (MANF). MANF Therapeutics, Inc. is developing MANF-based products as treatments for brain and ophthalmic disorders. MANF was discovered by the Company's Chief Scientific Officer John Commissiong, PhD. Dr. Commissiong discovered MANF from AMBS' proprietary discovery engine PhenoGuard. AMBS also owns approximately 80 million shares of Avant Diagnostics, Inc. via the sale of its wholly-owned subsidiary Amaranthus Diagnostics, Inc. that occurred in May 2016.

For further information please visit [www.Amarantus.com](http://www.Amarantus.com), or connect with the Amaranthus on [Facebook](#), [LinkedIn](#), [Twitter](#) and [Google+](#).

### **About MANF Therapeutics, Inc.**

MANF (mesencephalic-astrocyte-derived neurotrophic factor) is believed to have broad potential because it is a naturally-occurring protein produced by the body to reduce/prevent apoptosis (cell death) in response to injury or disease, via the unfolded protein response. By administering exogenously produced MANF the body, Amaranthus is seeking to use a regenerative medicine approach to assist the body with higher quantities of MANF when needed. Amaranthus is the front-runner and primary holder of intellectual property around MANF, and is initially focusing on the development of MANF-based protein therapeutics.

MANF's lead indication is retinitis pigmentosa, and additional indications including Parkinson's disease, diabetes and Wolfram's syndrome are envisioned. Further applications

for MANF may include Alzheimer's disease, traumatic brain injury, myocardial infarction, antibiotic-induced ototoxicity and certain other orphan diseases.

In April 2017, Amaranthus incorporated the wholly-owned subsidiary MANF Therapeutics, Inc. to focus on progressing preclinical and clinical development of MANF.

### **Forward-Looking Statements**

Certain statements, other than purely historical information, including estimates, projections, statements relating to our business plans, objectives, and expected operating results, and the assumptions upon which those statements are based, are forward-looking statements. These forward-looking statements generally are identified by the words "believes," "project," "expects," "anticipates," "estimates," "intends," "strategy," "plan," "may," "will," "would," "will be," "will continue," "will likely result," and similar expressions. Forward-looking statements are based on current expectations and assumptions that are subject to risks and uncertainties which may cause actual results to differ materially from the forward-looking statements. Our ability to predict results or the actual effect of future plans or strategies is inherently uncertain. Factors which could have a material adverse effect on our operations and future prospects on a consolidated basis include, but are not limited to: changes in economic conditions, legislative/regulatory changes, availability of capital, interest rates, competition, and generally accepted accounting principles. These risks and uncertainties should also be considered in evaluating forward-looking statements and undue reliance should not be placed on such statements.

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