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The Scientific Origins Behind Vascarta Inc. and VAS-101 (Vasceptor®)

Advancing Treatments for Pain and Inflammation

The Vasceptor® (VAS-101) journey began nearly forty years ago when Dr. Joel Friedman, MD, PhD, worked at the iconic research and development company, Bell Laboratories, in New Jersey. At Bell Laboratories, Dr. Friedman pioneered the use of lasers in biophysics research. He used nanosecond and picosecond laser pulses to gain a deeper understanding of how protein dynamics control protein function and stability. The hemoglobin molecule was a major focus.

Dr. Friedman moved to the NYU Department of Chemistry and then to the Albert Einstein College of Medicine as a Professor and Chairman of the Department of Physiology and Biophysics in 1991. At Einstein, he and his son, Dr. Adam Friedman, began their breakthrough work in developing nitric oxide (NO)-releasing nanoparticles, which showed promise as NO delivery systems for treating both inflammatory conditions and infected wounds. The nanoparticle approach proved highly effective in multiple preclinical studies including treating systemic conditions such as the cytokine storm and ischemia reperfusion injuries; however, the regulatory hurdles for getting FDA approval for IV infused nanoparticles posed a major challenge for clinical translation. Further work in "NO delivery systems" was needed.

Since intravenous applications of NO releasing nanoparticles were impractical due to the possibility of causing embolisms and other circulatory problems, Dr. Friedman shifted his drug delivery strategy. Instead of trying to directly deliver NO into the circulation, which has many potential complications, he pursued a non-nanoparticle-based strategy to deliver through the skin and directly into the circulation active agents that stimulate the production of NO in the vasculature. He discovered that a biocompatible mixture of excipients could not only solubilize hard to dissolve small molecules but also enhance drug delivery through the skin and into the circulation with consequential applications for a wide range of inflammatory conditions.

Curcumin's Potential in Systemic Inflammation

It is well established in the scientific literature that curcumin, a natural polyphenol compound found in turmeric, had the potential to treat systemic inflammation and slow the cytokine storm which was implicated in the deaths of millions of patients globally during the COVID pandemic (2020-2022). Inflammation also triggers pain as people age. Curcumin enhances NO production in blood vessels, limits inflammation generated by activated macrophages, monocytes, and neutrophils, and initiates antioxidative stress pathways.

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The Challenge of Oral Curcumin and the Emergence of Vascarta Inc.
Curcumin possesses limited bioavailability and therapeutic efficacy when delivered orally which is how it is taken by tens of millions of individuals globally. Although oral curcumin is a well-studied over-the-counter dietary supplement it is i) poorly absorbed, ii) chemically modified by the gut, iii) ineffective transiting the gut to the circulation, and iv) further modified by the liver. Loading high concentrations of curcumin into a novel drug delivery gel matrix (VAS-101; Vasceptor®) presented the opportunity to overcome (and bypass) the limitations associated with oral curcumin. It is at this point (in early 2020, at the beginning of the Covid pandemic) that Vascarta Inc. was established. Since that time, it has been led by Dr. Richard Prince, Chairman, CEO & President and Dr. Friedman, Scientific Founder and Chief Scientific Officer. An esteemed management team, scientific advisors and business consultants round out the Vascarta team.

The Story Builds - Curcumin's Unique Mechanism of Delivery
The potential therapeutic benefit of curcumin delivered by transdermal means relates to its potent anti-inflammatory properties, blood pressure regulation, and its unique mechanism of delivery through the bloodstream. Curcumin, when applied topically, is absorbed into the bloodstream through the layers of the skin and loaded onto circulating red blood cells. The red blood cells release curcumin in the arterioles and capillaries through sheer stress structural distortion due to increased velocity of the red blood cells as they enter narrow blood vessels.

Harnessing red blood cells as a natural stealth drug delivery vehicle for curcumin overcomes the limitations of oral administration and represents a paradigm shift in medicine.

Once released, Curcumin among its many activities, stimulates NO production in the lining of the blood vessels without the risk of dangerous side effects. As a result, transdermal-delivered curcumin prevents, limits, and reverses endothelial dysfunction. The endothelium in healthy individuals maintains the proper dilation and constriction of the blood vessels. This function determines how much blood is received by the body's various tissues on a moment-to-moment basis. Endothelial dysfunction, however, results in the loss of normal vascular function and is in effect the common pathway through which all ‘pro-inflammatory’ diseases and conditions promote clinical consequences such as CVD, renal failure, sexual dysfunction, cognitive decline, and more.

With transdermal curcumin, Vascarta believes it has uncovered a unique ability to promote, in Dr. Friedman’s words, “a symphony of harmonious interaction of different signaling pathways leading to vital therapeutic benefits.” The scientific foundation for Vasceptor was thus set.

Therapeutic Value
The recently patented curcumin-delivery system has a wide range of potential medical applications, including treating cardiovascular disease, renal failure, sexual dysfunction, cognitive decline, and inflammatory conditions. Curcumin has the potential to inhibit the development of dementias and Parkinson's disease by stopping neuroinflammation. The next decision - where best to target curcumin for launching animal model research and clinical trials.

Targeting Disease – Treatment of Osteoarthritis and Sickle Cell Disease
Realizing the considerable morbidity and pain caused by osteoarthritis (OA) and sickle cell disease (SCD) and the size of the OA market, these two conditions were selected by Vascarta for clinical development. The Phase 1 clinical trials for both indications are anticipated to conclude during Q4 2025. The development of VAS-101 is two generations in the making. Like other historic therapeutic advancements, a confluence of medical innovation, problem solving, and unwavering persistence has catapulted Vascarta to the edge of becoming a new global powerhouse in the effective management of pain and inflammation.

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