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PharmaCyte Biotech Discusses Future of Cannabis Research Program, Competitors and More with Program's Director

LAGUNA HILLS, Calif., April 18, 2017 (GLOBE NEWSWIRE) -- PharmaCyte Biotech, Inc. (OTCQB:PMCB), a clinical stage biotechnology company focused on developing targeted treatments for cancer and diabetes using its signature live-cell encapsulation technology, Cell-in-a-Box®, released today an interview-style Q&A article that discusses the company's Cannabis Research Program with Mark L. Rabe, MD, the Director of PharmaCyte's Cannabis Program Development.

Given the latest research recently presented by Dr. Hyslop and his colleagues at the University of Northern Colorado (UNC), what are your thoughts about the future of PharmaCyte's Cannabis Research Program?

Dr. Mark Rabe: "The latest news from Dr. Hyslop and the UNC team was very encouraging. As a result, PharmaCyte's Cannabis Research Program is in high gear. The UNC research focuses on developing targeted cannabinoid-based chemotherapy utilizing the Cell-in-a-Box® live-cell encapsulation technology.

"The therapy is designed to work by implanting encapsulated engineered cells in a blood vessel near a tumor. Then, a prodrug is administered upstream and activated by the encapsulated cells at the site of the tumor. Cell-in-a-Box®, which encapsulates cells in a bio-inert cellulose-based porous polymer, serves as the platform. Of significance, UNC reported that cannabidiol (CBD), a cannabinoid molecule derived from the *Cannabis* plant, had anti-cancer effects against several types of cancer cells that were dose-related. It was also reported that an enzyme has been identified that could convert an inactive drug, or "prodrug," form of cannabinoid molecules into the corresponding active chemotherapeutic forms.

"Work is now underway to engineer human cells to produce this enzyme. Importantly, the 'parental' or originating cell line being used is identical to that being used by PharmaCyte for its pancreas cancer therapy, which is soon to enter a pivotal clinical trial."

If the cell line that PharmaCyte uses in its pancreas cancer treatment does in fact work with Cannabis as well, what is the significance of this find given how much work has already been done on that cell line?

Dr. Mark Rabe: "Utilizing the same parental cell line is a major advantage. Earlier work and studies have shown that the cell line being utilized is very amenable to Cell-in-a-Box® live-cell encapsulation. Further, this cell line is about to receive additional FDA evaluation as part of PharmaCyte's upcoming pivotal clinical trial in the treatment of locally advanced pancreas cancer. In that trial, the treatment's parental cell line has been engineered to produce an

enzyme that converts the conventional chemotherapy drug ifosfamide, which is a prodrug, into its active form. PharmaCyte's Cell-in-a-Box® therapy is a biologic, which means it faces far greater regulatory hurdles compared to treatments that use a single molecule. In our opinion, when it comes time to present a Cell-in-a-Box®/cannabinoid therapy to the FDA, substantial data supporting the parental cell line choice will already exist."

Walk us through the process of how cannabinoids work and how PharmaCyte's therapy can make the cannabinoids work better/be more effective?

Dr. Mark Rabe: "This question addresses the 'active' component of the therapy. The medical literature is full of evidence that cannabinoids, specifically CBD and tetrahydrocannabinol (THC), exert anti-cancer properties in several ways. They: (i) slow the growth of tumor cells; (ii) slow the penetration of blood vessels into tumors that cause metastasis; and (iii) promote programmed cancer cell death. Cannabinoids are believed to exert these actions through interactions with endocannabinoid receptors located on cell membranes and the intracellular processes that control the cancer process.

"Presently, patients who choose to treat cancer with cannabinoids do so by consuming it. The general approach used is like that of conventional chemotherapy. That is, use as much as safely possible to maximize the concentration of the chemotherapeutic agent at the site of a tumor. However, generalized side effects from large doses of cannabinoids, such as unwanted psychoactivity and sedation, often limit their use. Control over cannabinoid composition is also difficult. The goal of targeted therapy is to optimize drug concentration at the site of a tumor while minimizing side effects."

Can you explain what it is that the eventual cell line being encapsulated would be activating in PharmaCyte's therapy?

Dr. Mark Rabe: "This question addresses the 'prodrug' component of the therapy. As mentioned, PharmaCyte's therapy is designed to utilize an engineered cell line which, when encapsulated with Cell-in-a-Box®, will enzymatically convert a cannabinoid prodrug into its active form. Since the UNC research and numerous other studies have confirmed that cannabinoids like CBD and THC have anti-cancer properties, it is necessary to have an inactive, or prodrug, version of these molecules suitable for enzymatic conversion.

"We have several prodrug options. For example, in the *Cannabis* plant, CBD and THC have naturally existing precursors that could be activated. Another approach is to modify CBD and/or THC in such a way as to render the molecules inactive. A cell line that produces an enzyme to un-modify the modified molecules would then generate the active drug."

In what therapeutic areas do you envision PharmaCyte's therapy being able to work?

Dr. Mark Rabe: "Cell-in-a-Box® is extremely well-suited for targeted chemotherapy where prodrugs are enzymatically converted into active drugs at the site of a tumor. The platform can be used with conventional agents, such as ifosfamide, and potentially with cannabinoids. Tumor targets include any solid tumor, including pancreas, brain, breast, prostate, liver and others.

"The Cell-in-a-Box® platform also has potential application in the treatment of other

diseases. For example, cannabinoids have well-documented pain-relieving and neuroprotecting effects. Cannabinoids have also been shown to have beneficial effects in the treatment of diseases like Alzheimer's disease and diabetes. The challenge with such treatments, in addition to answering the prodrug/active drug and cell line questions, is optimizing dosing. The beauty of Cell-in-a-Box®, however, is that the capsule size, and consequently the number of cells contained, can be controlled. Hence, controlled micro-dosing is possible."

Do we know where PharmaCyte fits into the current landscape with regard to creating a therapy in this space? Are there competitors?

Dr. Mark Rabe: "The current U.S. medical *Cannabis* industry has been estimated to be worth about $3.0 billion, and it is expected to more than double as more states legalize the use of *Cannabis* as medicine. There are dozens of companies in the space. Multi-billion-dollar big pharma companies such as Merck, Sanofi-Aventis, AbbVie and Bristol-Meyers Squibb hold cannabinoid-related patents and are conducting cannabinoid-related research. These companies also have broad oncology portfolios.

"GW Pharmaceuticals is a U.K.-based *Cannabis*-focused company with a market cap of approximately $3 billion. GW Pharmaceuticals has an extensive patent portfolio and already has an approved product, Sativex®. Another GW product, Epidiolex®, is in clinical trials. There is also an array of smaller, publicly traded specialty pharma, drug delivery and *Cannabis*-focused companies developing various cannabinoid-based therapies.

"Within this landscape, PharmaCyte's product is quite unique and offers substantial potential benefits over other approaches, including a bio-inert targeted delivery system, control over the number of activating cells and control over prodrug selection and dosing. If they haven't already, I would think that many of these companies will be taking notice of PharmaCyte's cannabinoid therapy as a great potential partnering or licensing opportunity."

What is the process moving forward with the development of PharmaCyte's therapy using cannabinoids?

Dr. Mark Rabe: "Work will continue at UNC to study the anti-cancer effects of cannabinoids as well as to complete development of the cell line. Then, the cell line's ability to convert a prodrug into an active drug will be analyzed. If it works, these cells will then be encapsulated with Cell-in-a-Box® and tested in animal cancer models. At the same time, we are also exploring other possible uses of Cell-in-a-Box® in combination with cannabinoids."

With the current climate in this country in the Cannabis sector, what are your expectations for PharmaCyte's ability to create a therapy and get it into clinical trials?

Dr. Mark Rabe: "Developing a new therapy is a complicated process, particularly when utilizing a breakthrough technology such as Cell-in-a-Box®. To date, PharmaCyte has successfully completed many of the necessary steps with only a few to go. Ongoing work in the remaining areas is promising. One challenge that we have experienced related to development of a cannabinoid-based therapy is working within existing U.S. laws and drug schedules. For example, it took over two years to obtain the necessary licensure and approved *Cannabis* research material. With a new administration in Washington, it remains

an open question as to whether getting a product that utilizes cannabinoid molecules into U.S. clinical trials and available to patients will become harder or easier.

“Interestingly, in contrast to the U.S., Israel has embraced medical *Cannabis* and is the world leader in cannabinoid research and production with over 500 companies in the sector and 120 ongoing studies and clinical trials. With estimates that the global market for medical *Cannabis* may reach $50.0 billion by 2025, the Israeli government is poised to allow these companies to begin exporting their products and dominate the world industry.”

About PharmaCyte Biotech

PharmaCyte Biotech is a clinical stage biotechnology company developing therapies for cancer and diabetes based upon a proprietary cellulose-based live cell encapsulation technology known as “Cell-in-a-Box®.” This technology will be used as a platform upon which therapies for several types of cancer and diabetes are being developed. PharmaCyte’s therapy for cancer involves encapsulating genetically engineered human cells that convert an inactive chemotherapy drug into its active or “cancer-killing” form. These encapsulated cells are implanted as close to the patient’s cancerous tumor as possible. Once implanted, a chemotherapy drug that is normally activated in the liver (ifosfamide) is given intravenously at one-third the normal dose. The ifosfamide is carried by the circulatory system to where the encapsulated cells have been implanted. When the ifosfamide comes in contact with the encapsulated cells they act as an artificial liver and activate the chemotherapy drug at the source of the cancer. This “targeted chemotherapy” has proven effective and safe to use in past clinical trials and results in no side effects.

In addition to developing a novel therapy for cancer, PharmaCyte is developing a treatment for Type 1 diabetes and insulin-dependent Type 2 diabetes. PharmaCyte plans to encapsulate a human cell line that has been genetically engineered to produce, store and release insulin in response to the levels of blood sugar in the human body. The encapsulation will be done using the Cell-in-a-Box® technology. Once the encapsulated cells are implanted in a diabetic patient they will function as a “bio-artificial pancreas” for purposes of insulin production.

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This press release contains forward-looking statements, which are generally statements that are not historical facts. Forward-looking statements can be identified by the words "expects," "anticipates," "believes," "intends," "estimates," "plans," "will," "outlook" and similar expressions. Forward-looking statements are based on management's current plans, estimates, assumptions and projections, and speak only as of the date they are made. We undertake no obligation to update any forward-looking statement in light of new information or future events, except as otherwise required by law. Forward-looking statements involve inherent risks and uncertainties, most of which are difficult to predict and are generally beyond our control. Actual results or outcomes may differ materially from those implied by the forward-looking statements because of the impact of several risk factors, many of which are discussed in more detail in our Annual Report on Form 10-K and our other reports filed with the Securities and Exchange Commission.

More information about PharmaCyte Biotech can be found at www.PharmaCyte.com. It can also be obtained by contacting Investor Relations.

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