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## How Artificial Intelligence Fits into the Pharmaceutical Industry

### Dr. McDonough:

You have probably heard the term “artificial intelligence,” and it does sound high Sci-Fi exciting, interesting, but artificial intelligence is playing a big role in medicine and a role that is only growing.

Hi, I am Dr. Brian McDonough. Welcome to Primary Care Today on ReachMD. My special guest today is Dr. Cecilia Van Cauwenberghe, and Dr. Van Cauwenberghe, is an expert in artificial intelligence, studies it, understands it. And first of all, Dr. Van Cauwenberghe, welcome to the program, and explain to us what artificial intelligence really means, a little bit about the evolution. I think it would be interesting for everyone.

### Dr. Van Cauwenberghe:

Thank you very much, Brian, and yes, actually in Pharma, artificial intelligence is considered or has the optimal synergy between leading edge computation and science and therapeutic developments. So, to understand it, other approach to embrace drug discovery and developments and other medical indications in that true artificial intelligence impacts, heavily impacts in the pharmaceutical industry, we need to pay attention to some factors no one has. One is the technology synergy, so that advances in life science research and development in the past 2 or 3 years and how they are playing a leading role in the transformation of the healthcare industry. So, this myriad of new developments in the fields of gene and new therapies empowered with nanotechnologies, technologies or novel, smart molecular approaches are extensively transforming the practice, discovery and development landscape for the effective treatment of disease. On that note, artificial intelligence is poised to provide the best treatment approach to leverage scientific literature base and state and novel and clinical data to drive more decisions.

Regarding your specific question, one of the most important things to understand here, is the evolution of artificial intelligence; that is how artificial intelligence meets pharmaceutical applications and development. Progress in AI first came from the cybernetics and symbolic approach through rules-based techniques. So, this statistical approach dominated until presently when breakthroughs in neural networks were designed, increased accuracy and natural language processing and computer vision. So, this approach is revolutionizing AI research.

Broadly speaking, artificial intelligence enables machines, such as computer systems, robots, to use algorithms to render intelligence and the capability to learn from deducing patterns on raw data by recognizing models consisting of sampling. What does it mean? AI enables the creation of a cognitive system that has the capability to process, analyze and scale data and communicate seamlessly with interconnected machines. So, the intelligence allows machines to independently take actionable independent positions without the requirement of human intervention; that is machine learning algorithms further enhance AI while empowering the machines to learn from their own past experiences, just like humans. That is the real power of artificial intelligence, and that is the way in that this powerful tool can be used to design and develop novel drugs or design novel therapeutics and novel molecules or design clinical trials. That is the real power of AI in Pharma.

### Dr. McDonough:

Cecelia Van Cauwenberghe is working in the area of AI, explaining what it is. Where can we see, you mentioned in Pharma and in things that are being done, where will we see some results? Are there any real world examples that you wanted to share with us? Are we there at that point?

### Dr. Van Cauwenberghe:

Yes, exactly, that is important because, while we define artificial intelligence and we define some changes in the pharmaceutical industry with did developments of new life science techniques, but now how to match this advancement with drug discoveries. What we

can see about this interaction between these new technologies in the pharmaceutical industry, that multiple companies are taking advantage of AI-based technologies from groundwork on scientific literature, clinical outcomes, dissertations, and proceedings, drug and participating investigations. One of the most important things of AI is that also enables to understand not only words, but also concepts. That is a way in that we can emulate human thinking but empowered with a machine learning technique. So, that means that not only structured data but also unstructured data from multiple sources can be leveraged as never seen before. New correlations between molecular biological entities and disease onset and progression can be found. The companies are using this information which is available in the Cloud or available through multiple registries or libraries or data repositories to develop new concepts that help to really energize Pharma. One example could be the patient recruitment for clinical trials, for example. That is dramatically facilitated through the access to very comprehensive databases, which can determine eligibilities almost instantaneously. So, here we can see a typical example in that a lot of times many and really important decisions can be made by using AI, and this can be used right now, so we don't have to wait 5, 10 years to see this result. It can be used right now. On the other hand, AI-driven platforms are focused on leveraged data, also from ongoing clinical trials, also enable to establish the optimal pathways and further clinical validation, design and execution.

Other things that bring challenges may be overcome by empowering drug discovery and development with AI-driven technologies. For example, the risk in models become the standard for us in which AI can take an important place in projects. The pharmaceutical industry leveraged artificial intelligence from many corners. So, companies are facilitating the development of potential cures for multiple diseases, including life-threatening areas such as rare and chronic diseases. New predictive and prognostic solutions are helping medical researchers to identify optimal targets, for example. AI-driven platforms work with extremely large databases. Gene mutations, protein targets, molecules, signaling pathways, disease events, clinical records, clinical trials, so allowing matching this information to find hidden drug disease correlations.

Dr. McDonough:

Dr. Cecilia Van Cauwenberghe is our guest. We are talking about artificial intelligence on Primary Care Today, here on ReachMD, and talking about the role in pharmaceutical industry. And there are those who are afraid of artificial intelligence. They see their jobs being replaced. They see horror movies being made. Is that unrealistic? I mean, it seems to me that this is just a maximization of technology to try to improve life? What's your thoughts on that?

Dr. Van Cauwenberghe:

Yes, I understand we have all fears to many announcements (sic), but one of the first things is that, in part, as I explained before, artificial intelligence is not a new tool or a new technology. In fact, machine learning, deep learning, were a development in other fields of science, but what is important to understand here is that other advances in the life sciences or in Pharma or the maximization of the technology synergy with the other fields of research—genomics level, for example, or stem cell therapies or things like that—that synergy between this huge amount of data that we have now access to is empowered also, or is enabled that artificial intelligence can be the really, or can be leveraged in all the power. So, it is nothing to fear indeed, because what AI allows right now is to leverage the huge amount of data that we have and then to improve or to find new solutions to things that never before that we see that we could solve, so that is the real projections with AI. When you think in, so this is nothing that could be replaced into the human brain or the human capability. It is just a new way to improve our decision-making process. It is to leverage the best of the human thinking with the best of computing machines.

Dr. McDonough:

Great way to explain it. And I want to thank you, Dr. Cecilia Van Cauwenberghe, for joining on Primary Care Today on ReachMD. I think you explained a lot about AI and also kind of comfort people, but also see the future and where it can be helpful. Thank you so much for taking the time to join us today.

Dr. Van Cauwenberghe:

Thank you, Brian.

Dr. McDonough:

I am Dr. Brian McDonough. Hope you enjoyed this edition of Primary Care Today on ReachMD. If you didn't hear it all, you can download the podcast and you can hear it again in its entirety. Thanks again for listening.