

# Dr. Anthony C. Chang: artificial intelligence (AI) depicts future medical blueprints

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## Editor's note

Dr. Anthony C. Chang (MD, MBA, MPH, MS) is the Chief Intelligence and Innovation Officer and Medical Director of the Heart Failure Program at Children's Hospital of Orange County. He is known for several innovations in pediatric cardiac care, including introducing the cardiac drug milrinone and co-designing (with Dr. Michael DeBakey) an axial-type ventricular assist device in children. He is the founder and medical director of the nascent Medical Intelligence and Innovation Institute (MI3) that is supported by the Sharon Disney Lund Foundation. The institute is dedicated to implement data science and artificial intelligence (AI) in medicine and is the first institute of its kind in a hospital. He intends to build a clinician-computer scientist interface to enhance all aspects of data science and AI in health and medicine. He currently lectures widely on big data and AI in medicine (he has been called "Dr. A.I." and has given a TEDx talk and is on the Singularity University faculty). He is the organizing chair of several Artificial Intelligence in Medicine (AIMed) meetings in the U.S. and abroad that will focus on AI in healthcare and medicine. He intends to start a new group for clinicians with a special focus on data science and AI (ai.MD).

It is a great honor for us to conduct an interview with Dr. Chang to share his career experience, research interests and provide some of his latest insights into the field of medical AI (Figure 1).

## Interview

**JMAI:** Looking back on your entire career, what made you choose medicine to be your profession at the very beginning? What have been driving you to develop step by step and make all these achievements in the field of Pediatrics?

**Dr. Chang:** I had originally wanted to be an architect but



**Figure 1** Dr. Anthony C. Chang in Hong Kong office of AME Publishing Company.

when I heard a one-hour lecture by a pediatric cardiologist at the NIH when I was 16 years of age, this epiphanous experience changed my future direction.

I really enjoyed the intersection between pediatric cardiology and pediatric intensive care and that dual education and training allowed me to do both (pediatric cardiac intensive care). Perhaps my affinity to be in the middle of two separate domains has always been part of my DNA.

**JMAI:** AIMed was founded in 2013 and has now become one of most influential societies in the field of medical AI. As the founder of AIMed, what were your initial thoughts of starting this society?

**Dr. Chang:** It was started in 2015 (with two prior meetings 2013 on exploring this area) and I learned much about data science and AI during my years at Stanford (I was inspired to go back to school after seeing the supercomputer Watson defeat the human champions in 2011).

I would like to bring the fascinating world of AI to clinicians in a way that they can learn and adopt this

portfolio of technological tools to medical practice. I would also like to form a much more robust interface between clinicians and data scientists.

**JMAI:** *With rapid development of science and technology, concepts such as AI and Internet of Things have gradually penetrated into the medical field. Can you tell us how we are benefitted by combining AI and medicine?*

**Dr. Chang:** There is still very little overlap between the domains of clinical medicine and AI. I think a few of the clinicians with dual education and training can create a new dimension in clinical medicine that accommodates this new paradigm shift and work more closely with data scientists to affect an exponential increase in medical knowledge.

Examples of use now include medical image interpretation, decision support, and precision medicine but the potential in this area is much greater and will should include augmented and virtual reality, blockchain, cloud computing, and cognitive computing and embedded AI.

**JMAI:** *Despite the rapid development of medical AI in recent years, it is not without technical and clinical challenges. What do you regard as today's biggest challenge to medical AI?*

**Dr. Chang:** I think the biggest challenge to medical AI, or medical intelligence, is access and interpretation as well as security of data.

A second challenge is lack of optimal interaction between the data scientists and clinicians to determine the right problems that need to be solved.

**JMAI:** *How do you see the future of medical AI?*

**Dr. Chang:** The future will be very promising as more clinicians and data scientists work closer together to solve the enigmas in medicine. This is absolutely necessary as clinicians are fatigued from the medical record burden as well as exponential rise of medical knowledge (now doubling every 2-3 months).

The future areas of medical AI include augmented and virtual reality, blockchain, cloud computing, cognitive computing, deep learning and its variants, and embedded AI.

**JMAI:** *You are not only an outstanding clinician, but also actively involved in scientific research and various academic associations and organizations. Having all these roles at hands, you must be faced with lots of stress and responsibilities. How do you adjust yourself and adapt to different stressful environments while enjoying yourself?*

**Dr. Chang:** I think if one is truly passionate about something in life, it is not stressful and it is naturally enjoyable. It is why musicians and athletes can practice for hours and not realize that much time has passed.

What I learn in AI helps me to be an even better clinician and what I experience as a clinician guides me to apply AI to resolve its problems.

**JMAI:** *As an experienced doctor, what would you advise young doctors and scholars to go beyond themselves and work to becoming future elites?*

**Dr. Chang:** I think some basic knowledge of data science and technology will be a requisite part of the education and training for the 21st century clinician.

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