The Speed of Medical Advancement

Putting aside our relentless focus on social media and turning to read about science, we realize that the world is at the precipice of breathtaking advancements in biology and medicine. We are a long way from the medical practices in the Wallowa Valley of the early 20th Century.

In 1904 Dr. C.T. Hockett graduated from Willamette Medical School and practiced most of his life in the Valley. However, the school was considered so deficient that it was closed and merged with the University of Oregon Medical School in 1913. Despite the limited instruction, Dr. Hockett in 1910 successfully performed a double leg amputation above the knee on an injured railroad worker in Cottage Grove (before moving to the County). In those days of limited medidal education, you learned on-the-job, and fast, a good mind also helped. Medical training was sketchy.

My first experience with modern medicine was getting shot with penicillin for pneumonia in 1952. My second experience was lining up outside the Joseph elementary school in our overcoats and galoshes to get an injection of the Salk polio vaccine in 1956. It took Jonas Salk seven years to develop that polio vaccine (on top of efforts since 1935). In 2020-21 it took less than one year for Moderna and Pfizer to develop the vaccine for Covid-19 using new mRNA technology (also it had nothing to do with politicians).

Decoding the first human genome (DNA codes) took almost thirteen years (ending in 2003) and cost $3.2 billion. Currently we are on track to decode a person's genome for $100 in less than one hour.

The next advance in computing power will be to store information in tiny molecular fragments of the DNA chain, then disassemble these molecules, convey them to another location, and reassemble them for information or action. Enormous amounts of information can be stored in molecular DNA. The entire information in the world could be stored in a container of molecules equal to two and one-half gallons of liquid.

To advance to this next level of information storage and use, current digital computers need to be more powerful, and the software needs to be more intelligent to do the integration of knowledge required. Enter Nvida Company and Artificial Intelligence (A.I.). Nvida, guided by Jensen Huang (graduate of O.S.U.) has developed the most powerful computer chip in the world which processes

information in streams (parallel computing) instead of one bit at a time like older Intel chips. These are called neural networks, like in our own brain. Two standard Nvida computer cards can do the processing of 16,000 older computer cards. The latest Nvida model can do processing that once took days in less than one minute. These Nvida cards are now the sole basis of most A.I. processing by Google, Microsoft, and everyone else. Nvida's stock price has risen from $44/share to $915/share in five years and today the company is valued at $2.4 trillion dollars, and it is not that large of a company. A.I. software running on these chips has already advanced to the point that some researchers don't completely understand how the program "thinks".

With both enormous processing power and ever-increasing intelligence in computing, the doors of bio-medical progress are swinging wide open. The possibilities for preventing and curing disease are astounding. As I write this, mosquitoes are being genetically modified to alter their inherited traits, which will prevent them from passing on deadly pathogens, like malaria. Most of this research is not about putting foreign compounds into humans, but rather it is to find ways to activate the largest pharmaceutical factory in the world, the cell. The human cell has the power to correct DNA mutations, destroy pathogens, and eliminate cancer cells; its ability just needs to be activated. AI is rapidly becoming the right-hand assistant to scientists who seek to find how all of these cellular interactions happen. AI powered by powerful new computer chips can chew through large amounts of undigested data and find the relevant inter-connections for scientists to focus on. These AI entities don't replace humans, rather they become a powerful assistant for doctors and researchers to push the boundaries of human knowledge.

Of course there are always negatives in all of this. Energy consumption is expected to rise as large computer server farms are built to power A.I. This could exacerbate climate change unless non-fossil fuel sources grow enough to meet this new need. Also, there are doomsayers who believe A.I. will open the door to sophisticated terrorism and social control by authoritarian personalities. And there are religious radicals who would legislate against science advancement. However, as I survey the current state of climate disasters, violence, war, famine, and disease, I shake my head and ask, "how can it get much worse?". Humanity needs help from something independent of human emotion to raise us out of this mess we have made of our planet. We need an intelligence far more rational and comprehensive than our individually disconnected brains running on stone age emotion.

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