

TECH

*The Healthcare
Revolution*

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*A heartfelt thank you to my daughter Lena,
who was an outstanding collaborator
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And thanks too to Matthias,
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Introduction

When I began writing this book, I had no idea that the world would be facing the Covid-19 pandemic. Never before had we seen a pandemic that affected every continent at the same time. In all the different healthcare companies I have managed, such a calamitous scenario, where the whole world is brought to a halt, was never considered; if it had been, it would have been immediately dismissed as too far-fetched. On a personal and professional level, I admit this global health crisis took many of us by surprise.

Each episode of this disaster, which at the time of writing is far from over, has made me reflect. But it hasn't called into question my desire to share my experiences regarding the very important role Tech is playing in healthcare. Quite the opposite.

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What has been interesting is how, in one year, the public has dug into the details of diagnostics, drug and vaccines developments, and drug approval. The first focus of attention was on the tests, highlighting the challenges of having an easy to use, rapid, yet precise enough diagnostic. Sensitivity and specificity were debated. Numerous companies launched Covid-19 tests, approved under Emergency Use Authorization protocols – some to be withdrawn shortly after. There was an impressive number of people debating the need for vaccines that had to be safe yet available as soon as possible. And everyone was reading avidly about new potential treatments receiving Emergency Use Authorization.

All in all, the positive, for me, as a leader in health-care, was how suddenly this emergency increased public understanding of the issues involved: difficulty in establishing an accurate diagnosis; trying to develop a new treatment under time pressure; how complicated human biology is. This virus has had a particularly complex way of behaving, leaving half of us asymptomatic when we get it, yet probably contagious. But others, possibly due to some genetic variants, have suffered a violent illness, leading to a high death rate, often after lengthy ICU stays. With all this, I believe – and hope – that the world understands much better the challenges of drug development and diagnostics. I also think that the pharmaceutical industry got more appreciation for what it is doing, and a keener awareness of the difficulties of the task at hand.

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With more people exploring the details of the health-care industry, many have also begun to understand how important Tech is in healthcare: diagnostics, drugs, vaccines, prevention, monitoring, etc. Tech is the future of our health because it will transform our overall relationship with treatment: from diagnosis to the development of new personalized treatments and the follow-up of each and every one of us when we become patients.

Thirty years spent at the crossroads of health and technology has allowed me to observe the very special relationship that exists between these two fields. Today, my belief has become a conviction: the use of Tech and Artificial Intelligence in health contributes, and will continue to contribute massively, to the effectiveness of drug treatments for each of us and to public health for all.

Medicine has made enormous progress and undergone major changes, but the fact is the Tech revolution will be just as important to human health as the discovery of antibiotics or monoclonal antibodies. Yes, Tech is the patient's best friend. Tech allows her to understand and take charge of her disease so she can take better care of herself. At a time where chronic diseases are growing in number, managing our own health is a crucial factor in improving outcomes.

What matters to patients is to have access to the right drug, with the right dose, at the right time. The more personalized the treatment the better. In the future, speedier and more incisive diagnoses will mean earlier,

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and therefore more effective, treatment. Whereas previously drugs were meant for a wide range of patients, and involved a single dosage, we now see a move towards more precise, targeted treatments. This also means that very long and costly drug developments are needed for small groups of patients.

The convergence of Tech, AI and biology is generating an “innovation boost” in the world of healthcare. And we will see a shift in the pharmaceutical industry as we move into the age of *Pharmaceutical Intelligence*.

While we might not always be aware of it, Tech is already widely used in medicine, and has heralded great progress. Its impact on the treatment of breast cancer and cardiovascular disease, for example, is only the beginning! Tomorrow, Tech and AI will be more and more integrated into health care, with our full assent and with far-reaching implications—whether it’s improving analytics or diagnostics; cutting the number of time-consuming data searches; individualizing treatments; customizing dosages and posology; refining clinical trials; or improving patient comfort. From upstream processing of early warning signs to downstream monitoring of treatment, it is clear that new horizons will open up thanks to these two industries, for our greatest individual and collective benefit. I do think it’s time that we came to appreciate how Tech will help mankind rather than viewing it as a de-humanizing element, which has sometimes been the case in the past. With Tech,

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patients will be better protected, better monitored and better cared for.

In the years to come, we will certainly live longer but with many more chronic diseases. In this respect Tech is a formidable tool for managing our health; not as an all-powerful force but as an instrument at the heart of maintaining our physical and mental wellbeing. As a support for doctors and nurses, it will also be an aid to diagnosis and a facilitator of human intervention. Tech empowers us to focus on the person that is the patient: if we have misplaced any of our humanity on the road to medical progress, Tech will allow us to get it back.

I am absolutely convinced that medicine, and the entire healthcare system, will stagnate unless it develops a deeper understanding of every individual's health condition. That means having access to patient data (high- or population level, as well as individual level data). Thanks to the progress made in miniaturization and with the added value of connectivity, Tech and AI will allow us to leverage this knowledge acquired through the accumulation of data. Determining each patient's medical profile earlier and more precisely, they will be the lever for a more efficient and less fallible diagnosis. So, the power of data will be brought to bear on the diagnosis, making it data intelligent.

This abundance of available data and its detailed analysis by AI will feed a real health algorithm that is

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at once personalized, scalable, and predictive. Such a device will give patients better control of their disease, and allow doctors to adjust treatment to each individual, constantly improving its effectiveness. Moving from a drug for everyone to a *personal health algorithm* must be a public health priority. As the Covid-19 pandemic shows us every day, it is high time we entered the era of personalized therapy.

Genomics holds the greatest hopes for this personalized medicine: no longer just treating diseases but curing the individual. AI will enable the convergence of AI and genomics. We are still figuring out the genome on which so many major advances depend. The microbiome, for example, which is beginning to be sequenced and whose fundamental role in the functioning of the human body is now being revealed or epigenetics, which will help us understand how the external environment modifies the expression of certain genes.

The integration of Tech into healthcare can dramatically accelerate the discovery of molecules and the development of new drugs, particularly by reducing the duration of clinical trials. When it comes to urgently finding a new vaccine, the collective health benefits of this integration are obvious. It also opens up new fields: treatments focused on more precise targets, the development of drugs for rare diseases or increasingly small groups of patients, making it possible, for example, to treat cancers more and more effectively. In this age of customized medicines, Tech is maximizing time for the patient.

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Our hospitals are continuously improving their performance, doing amazing work saving people in desperate states of health. They are dealing with patients who are always older, suffering from multiple comorbidities – i.e. several diseases at the same time – and we expect magic from them. The integration of Tech and AI in medical practices will help them take the next step: moving from a 100% digital hospital to a 200% *humanized one*. The considerable progress made in data aggregation will finally make it possible to have immediate access to a patient’s medical information and to monitor it throughout their life.

A better and faster-treated patient is discharged earlier from the hospital, which can then devote itself to the task for which it was originally created, i.e. priority treatment of serious and acute cases. Being able to return home at the earliest opportunity and in complete safety is a goal for medical staff and health systems, but, above all, for patients. Through Tech, it will be possible to set up a state-of-the-art *Home Health* service, bringing the power of the hospital to the patient’s home, permanently connected with human medical intervention if necessary.

We know how critical the time factor is to health: tomorrow we will benefit from *Predictive Patient Safety*, analyzing the emergence of pollen-related allergies as early as possible, identifying the onset of an epidemic at an early stage, etc. Tech will give public health the means to be more responsive and effective. At a time when we

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are witnessing a heightened awareness of the risks associated with drugs, we will be able to take advantage of Tech to measure those risks more immediately, speed up reactions, and put in corrective measures.

The fact that Tech is helping us to humanize healthcare does not mean that we lose our privacy. Health data must remain the absolute property of each individual. And Tech is the only way to be able to protect *Personal Health Information* and ensure that everyone retains ownership of it.

As Tech brings the latest revolution in healthcare, for it to have its full effect, patients will have to take an active role in managing their condition, particularly when suffering from chronic diseases. The Tech revolution is also a revolution for the patient, whose role, behavior, and responsibilities are being renewed and increased. A *New Patient* appears, better informed and more capable, aware, and pioneering, with tools to manage their state of health. A new relationship can then be established, with the patient adding her input to the in-depth information her doctor already has. Doctors engaging patients in decisions about the most appropriate treatment journey for them will in turn improve the patient's health

So yes, health is and will increasingly be Tech. The following pages will take you to a new future, and it's coming tomorrow!

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