# 2 - C: Reductive Model of Medical & Scientific Knowledge

The reductive model of medical and scientific knowledge starts by breaking down complex phenomena, like healing, into fundamental parts. While this can help us make sense of complexity, it can also lead to over-simplification which can limit a holistic understanding of the topic at hand. As medicine has shifted to become more aligned with the sciences, it too has embraced the reductive model. One way that manifests is medical specialization. Medical specialization allows doctors to become experts in a particular body system or even a particular sub-part of a system. We have doctors who treat the endocrine system, the reproductive system, the brain, the gastrointestinal system. There are even doctors who specialize in just the feet (podiatrists)!

Medical specialization can be beneficial because the body is so complex no one can be an expert in the whole of it. But, medical specialization has some major downsides. First, it can leave body systems on the boundaries between specializations without a clear specialist. The jaw is one example. If you have jaw pain, is that a medical or dental problem? The jaw is involved in chewing, so you might think a dentist would treat jaw (mandibular joint) pain. But it would depend on that dentist's training and their evaluation of whether the root cause of your pain is dental or medical. The mandibular joint is also right next to the ear. Problems with that joint can even cause ear pain, so you might think an Ear, Nose, Throat (ENT) specialist would treat it. Some do, but most do not. The jaw is also close to the brain and has major nerves that run through it, so you might think a neurologist should treat it, but most do not. Rheumatologists deal with the joints, so you might consider seeing one about jaw pain, but unless your pain was due to arthritis or an autoimmune disease, they would likely refer you back to a dentist. The jaw turns out to sit right at the boundaries of a number of medical specialities. Some people may find care for jaw pain within mainstream medicine, but many people do not.

Another effect of the reductive model is that specialists tend to view problems through the lens of their specialty. When a biologist tells the story of connective tissue (as above), they start with healing. That is, connective tissue is understood as a part of the immune system. In the case of feline Ehlers-Danlos-like syndrome, the veterinary naming of genetic connective tissue variations refers to the effects of connective tissue on skin rather than the immune system. Cutaneous asthenia means ‘weak skin’ while dermatosparaxis refers to skin that tears easily. However, in the video, the first difference Cappy’s humans noticed was that he had wound healing problems. While collagen (an important protein that makes up some types of connective tissue) does affect the

skin, it also plays a role in immune function (healing). In the case of humans, when HCTDs are viewed from the perspective of an orthopedist or a rheumatologist, connective tissue variations are understood to cause joint and/bone problems. The reductive model can make it difficult to understand the ways that connective tissues affect the whole body because reductiveness runs the risk of compartmentalizing the body and treating each part/system in isolation. Under this model many doctors just don't know that much about connective tissue diseases precisely because variations in connective tissue affect virtually every part of the body–the skin, the joints, the immune system, and much much more.

When connective tissue variations like hEDS or Marfan or rheumatoid arthritis are compartmentalized there is an effect on both medical research and medical care. The funding for medical research often drives medical specializations. For example, the weightloss industry and pharmaceutical industry have created the specialization of "Obesity Medicine" (link to Weight Science Module). So, research, not just doctors, can be hyper-focused, too. Again, there are some advantages to this. Researchers develop deep expertise. But research questions can get overly specialized and neglect the wellbeing of people with connective tissue variations. For example, researchers have spent many years focused on isolating the genetics of hypermobile Ehlers Danlos Syndrome – one of the most common heritable connective tissue diseases – while comparatively little research is done on improving care and quality of life for people with hEDS. While isolating the genes responsible may help with diagnosis, it does little to help people manage their conditions, minimize suffering, or reduce pain. Moreover, the focus of this research on genetics may not actually lead to easier diagnosis as genetic testing is extremely expensive and out of reach of many people. Worse, the identification of genes opens the door to eugenics via gene editing technologies.

People with variations of connective tissue that affect the whole body, frequently have trouble accessing medical care that deals with all of the elements of their condition. An orthopedist might help with a person's joint instability, but they may not be thinking about the impacts to the immune system. A dermatologist might be able to help with skin fragility, but they may not be aware of the gastro-intestinal effects of the condition. People with connective tissue variations may experience the opposite of what is described in the example of the jaw. Rather than existing at the margins of medical specialties, they exist across almost all of the medical specialities. That means, in order to get comprehensive care, they may need to see a dozen or more specialists–something that is difficult in even the best healthcare systems in the world. However, in many places, including in the USA, accessing that many doctors is virtually impossible. Of course, people with connective tissue variations, can also have specific issues like jaw pain or other issues that exist in between medical specialties, like fatigue, that make it difficult to get any care at all.

People with connective tissue variations have an "everywhere" and "nowhere" problem in accessing healthcare as a result of the reductive model of medical research and practice. Their medical issues exist across all medical specialties, and so they are claimed by no single specialty rendering them invisible within the healthcare system. As a result, many people with hEDS report experiencing what researchers have termed "clinician associated trauma" while seeking care. In the most extreme cases, the reductive model of science and medicine can contribute to suicide as people living in extreme daily pain and experiencing medical neglect can become hopeless about

ever feeling better.

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