

SundayReview | OPINION

# When Blood Pressure Is Political

By SANDEEP JAUHAR AUG. 6, 2016

I teach a medical school course on homeostasis: how organ systems work together to maintain physiological balance. For example, when blood pressure drops acutely, the heart speeds up and the kidneys retain sodium and water, propelling blood pressure back to normal. If body temperature falls, we shiver to generate heat, blood vessels constrict to conserve heat, and we warm up. Homeostasis is about preserving constancy in the face of changing conditions. As a model for explaining human physiology, it does remarkably well.

However, there are aspects of the human condition that homeostasis cannot explain. For instance, blood pressure often fluctuates minute to minute. If the body is supposed to be maintaining an optimal set point, it doesn't seem to be doing a very good job. Blood pressure also increases steadily throughout childhood and adulthood. Why does the set point drift upward? To explain these things, some experts have proposed an alternative theory to homeostasis: allostasis.

Allostasis is not about preserving constancy; it is about calibrating the body's functions in response to external as well as internal conditions. The body doesn't so much defend a particular set point as allow it to fluctuate in response to changing demands, including those of one's social circumstances. Allostasis is, in that sense, a politically sophisticated theory of human physiology. Indeed, because of its

sensitivity to social circumstances, allostasis is in many ways better than homeostasis for explaining modern chronic diseases.

Consider hypertension. Seventy million adults in the United States have it. For more than 90 percent of them, we don't know the cause. However, we do have some clues. Hypertension disproportionately affects blacks, especially in poor communities. This may in part be because of genetics, but it is doubtful that this is a major factor; American blacks have hypertension at much higher rates than West Africans. Moreover, hypertension is also common in other segments of society in which poverty and social ills are rampant.

Peter Sterling, a neurobiologist and a proponent of allostasis, has written that hypertension in these communities is a normal response to "chronic arousal" (or stress). In small preindustrial communities, he observes, people tend to know and trust one another. When this milieu is disrupted, as in migration or urbanization, there is often an increased need for vigilance. People are frequently estranged from their neighbors. Communities become diverse and more mistrustful. Physical and social isolation can result. Add in poverty, racism, fractured families and joblessness, and you get extremely stress-prone populations.

Where homeostasis attributes hypertension to a defect of inner regulation, allostasis explains it as a normal response to social circumstances. Chronic arousal prompts release of "stress" hormones such as adrenaline and cortisol that tighten blood vessels and cause retention of salt. These in turn lead to long-term changes, like arterial wall thickening, that increase the blood pressure set point. The body adapts to this higher pressure and works to maintain it.

As an example of such arousal, Dr. Sterling notes that blood pressure is often constant till about age 6, but then it rises quickly as children detach from their parents and have to become vigilant against real or perceived threats. By age 17 almost half of all boys have blood pressures in the prehypertensive range, and about 20 percent have full-blown hypertension.

In the allostatic formulation nothing is "broken." The body is responding in the way it should to the chronic fight-or-flight circumstances in which it finds itself. As

Dr. Sterling notes, the allostasis model identifies a seeming paradox: People are dying, but their internal regulatory mechanisms are intact.

Allostasis is attractive because it puts psychosocial factors front and center in how we think about health problems. In one of his papers, Dr. Sterling talks about how, while canvassing in poor neighborhoods in Cleveland in the 1960s, he would frequently come across black men with limps and drooping faces, results of stroke. He was shocked, but today it is well established that poverty and racism are associated with stroke and poor cardiovascular health.

These associations also hold true in white communities. One example comes from the Whitehall study of almost 30,000 Civil Service workers in Britain over the past several decades. Mortality and poor health were found to increase stepwise from the highest to the lowest levels in the occupational hierarchy: Messengers and porters, for example, had nearly twice the death rate of administrators, even after accounting for differences in smoking and alcohol consumption. Researchers concluded that stress — from financial instability, time pressures or a general lack of job control — was driving much of the difference in survival.

Today it is clear that chronic diseases like hypertension, diabetes and heart failure are inextricably linked to the state of our neighborhoods, jobs and families. We must use this information in the fight against rising income inequality, high imprisonment rates and other social problems. Allostasis reminds us that to treat our ills we also have to repair our social fabric. We have to look at not only our bodies but also ourselves.

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