Empathy in Medicine A Neurobiological Perspective

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Empathy in Medicine—A Neurobiological Perspective

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A PHYSICIAN'S ATTITUDE AND APPROACH AFFECT EVery aspect of medical care for patients and their families. An empathic bedside manner is no quaint relic of the past. To restore and ensure public trust in the medical profession, new generations of physicians must understand the emotional, physiological, and practical consequences of discarding empathy. One legacy of medical education is overvaluing scientific measurement and undervaluing subjective experiences. The neurobiology of empathy offers hope for those who value the subjective experience of empathy and for those who find comfort in what can be measured.

Advances in neuroimaging have provided tools to measure activity in the neuroanatomical and physiological relay mechanisms that translate the emotional experiences of others to self-experiences in the observer.[1] The study of empathy is no longer a "soft science," but is increasingly grounded in empirical data. Mirror neurons, a specialized class of neurons in the premotor cortex and the inferior parietal cortex, provided the first neurobiological basis for translating actions that an individual observes in others into internal representations in the observer's brain and have spawned research among neuroscientists who study hemodynamic patterns of "self" and "other" representations of somatic sensations, pain, and empathy.[1]

Early studies examined physiological states between patients and physicians in which the autonomic arousal of both members of the dyad were simultaneously measured during psychotherapy. Using measures of heart rate and skin conductance, these studies suggested that patients and physicians were highly reactive to each other, producing physiological responses that could vary together in "concordance" or in "discordance," with the highest correlation between affect intensity and the degree of skin conductance activity.[2]

Physiological concordance has been correlated with patient perception of physician empathy. A study of 20 patient-physician dyads demonstrated a significant correlation between physiological skin conductance concordance and patient-perceived empathy on the Empathic Understanding Scale during psychotherapy ($r=0.47$; $P=.03$).[3] Clinical relevance emerged when the skin conductance tracings were reviewed in one therapy dyad in which the patient's skin conductance revealed some peaks of autonomic arousal that were 3 times that of the physician's. For defensive reasons, the patient had learned to conceal her anxiety since childhood and had used overeating to contain her anxiety, becoming 70 lb overweight. On "seeing" the autonomic arousal on the skin conductance tracings, greater empathy for the patient's distress was possible, facilitating verbal expression of her anxiety and changes in diet and contributing to a 40-lb weight loss that year.[4] The attunement to the hidden internal state of the patient may not have been possible without the physiological data.

In addition to physiological correlates of empathy, significant overlap exists between neural structures that control skin conductance fluctuations and the neuroanatomical structures implicated in neuroimaging studies of empathy.[1] Converging neuroimaging and clinical findings suggest that activity in the dorsal and genual regions of the anterior cingulate cortex is strongly associated with affective and bioregulatory processes, including nociception and representation of somatosensory, viscerosensory, and autonomic arousal states, including responses to emotional stimuli. These findings highlight the role of the anterior cingulate cortex in the integrative control of sympathetic skin conductance responses, particularly in generating physiological states necessary to appropriately meet contextual behavioral and emotional demands.[5]

The role of the anterior cingulate cortex and empathy for pain as a shared neural representation was demonstrated in a study of 16 couples[6] that showed that when loved ones say "I feel your pain," it is not just a figure of speech; they actually do feel it through neural pain representations in their own brains. In that magnetic resonance imaging study, the female partner in the scanner received a series of painful shocks through an electrode on her hand and could see her male partner receive similar shocks (via a cleverly angled mirror). A flashing light pointed out the next shock recipient. Whether the woman felt pain directly or anticipated her

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partner's pain, a similar pain matrix was activated in her brain.[6] In the "self pain" condition, the entire pain matrix was activated, while in the "other pain" condition, a large portion was activated. Thus, humans share neuroanatomical representations of pain, but they experience third-person pain only in attenuated form. This enables observers to experience another's pain to the extent that it may motivate an empathic response but not overwhelm the observer with personal distress and self-protection.[1] These mechanisms may facilitate altruistic behavior and may be a factor in choosing medical careers.

Empathy appears to be regulated by perspective-taking and by cognitive appraisal. In a magnetic resonance imaging study of 17 adults, participants were shown images of patients in pain. Higher activity was seen in the amygdala, anterior cingulate cortex, and insula when participants were asked to imagine that the pain was happening to them than when they viewed patients in pain. Additionally, when participants were informed that the pain they observed in others was part of an effective treatment that resulted in a cure, there was decreased activity in these emotional centers in the brain.[1]

Fluctuations in empathy have been documented in medical trainees.[7] Empathy begins to decline in the third year of medical school for complex reasons, including an emphasis on emotional detachment and clinical neutrality, overreliance on technology that limits human interactions, lack of role models, and inappropriate treatment of medical students.[7] In a neuroimaging study involving physicians (n=15) and controls (n=15) who were observing others being pricked by a needle,[8] physicians down-regulated their pain empathy response by inhibiting neural circuits involved in pain processing areas (somatosensory cortex, insula, anterior cingulate cortex, and periaqueductal gray). Down-regulation of the pain response dampened negative arousal in response to the pain of others. Without emotion regulation skills, constant exposure to others' pain and distress may be associated with personal distress and burnout, suggesting that down-regulation may have some beneficial consequences.

Although down-regulation of empathy may have important protective elements during medical training, the practical consequences of unempathic medical care may also have serious implications. Lack of empathy dehumanizes patients and shifts physicians' focus from the whole person to target organs and test results. This is not simply a moral or philosophical issue; empathy is an important component of clinical competence, without which there can be serious consequences. Empathic physicians can obtain critical information and insights that affect quality of care and, ultimately, medical outcomes. Evidence supports the physiological benefits of empathic relationships, including better immune function, shorter postsurgery hospital stays, fewer asthma attacks, stronger placebo response, and shorter duration of colds. Low physician empathy also affects physicians and trainees. An estimated 60% of practicing physicians experience symptoms of burnout, which is linked to lower job satisfaction, leaving the profession, increased substance abuse, and suicide.[9] Low physician rapport is correlated with lack of trust in physicians by patients as well as increased patient complaints and more malpractice claims,[10] which are linked to the costly practice of defensive medicine.

It is possible that empathy can also be up-regulated through education. Medical educators can teach students about the neurobiological correlates of empathy, demonstrate behavioral skills that build an empathic connection, and scientifically validate the importance of empathy in the patient-physician relationship, while also teaching self-regulation strategies that may help prevent emotional distress during medical training and other challenging situations. Advancing physician empathy with deliberate, neurobiologically informed training and research may be a helpful approach to enhance the professionalism and compassion that are the hallmarks of medicine.

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