



Glenn Duns

Regeneration

'Midway upon the journey of our life, I found myself within a forest dark.'¹

On the morning of Saturday 7 February 2009 I was working at a medical clinic in Whittlesea, Victoria, located about 40 km northeast of Melbourne. Finishing around noon, I walked across the parking lot in temperatures exceeding 40°C and strong gusts. At that moment these extreme conditions were fanning a bushfire that had started northwest of Whittlesea. The temperature would later peak at 46.4°C, the highest maximum temperature ever recorded in Melbourne, while wind gusts of over 90 km/h were recorded in several parts of Victoria.² This combination of extreme heat, strong winds and a forest dried out by years of drought transformed the bushfire into a conflagration that would eventually claim 173 lives.

On the following Monday morning, we started assessing the impact of the fire on our community. This included the death of many patients and one of our practice nurses. Over the next several weeks patients presented for burn dressings and counselling, and stories emerged of survival and trauma. One individual had escaped in his car just as the fence posts at the end of his driveway ignited in the heat; another person described returning to his property following the fires and finding equipment that had melted into molten puddles. With time, the burns and broken limbs gradually healed, while the psychological damage became increasingly apparent.

Several weeks after the bushfire, I drove through the nearby hills. My initial impression was of an incendiary bomb blast, with acres of blackened forest without a trace of green. The medically trained part of me saw something else, a vast network of neurons with interlacing axons and atrophic dendrites.

Over the next several months, as I counselled survivors of the fire and witnessed the development of post traumatic stress disorder (PTSD) symptoms, I was struck by the emergence of new growth in this blackened, desolate forest. This gave me encouragement, and I imagined a similar process of regeneration occurring with my patients.

Bushfires are part of the natural ecology of Australia. 'Nothing else produces the heat pulse that removes growth-inhibiting toxins in the litter, or opens tightly-closed fruits to release new seed, or penetrates deep into the soil to stimulate the germination of long-buried seed.'³ The problem is that conditions have changed such that, 'the infrequent fires that now occur under extreme weather burn much more intensely and have a significant impact on the built environment.'³ As a result, these fires can be more destructive and traumatic.

Trauma, both physical and psychological, can cause inflammation. Research has demonstrated that PTSD is associated with inflammation, both in the central nervous system and peripherally.⁴ Physical trauma is also linked to central nervous system inflammation. Research into traumatic brain injury has revealed that concussion can cause a neuroinflammatory response.⁵ This inflammation may be beneficial or detrimental, depending on its degree and duration: 'On the one hand, prolonged exposure to inflammatory cytokines is harmful, shifting the intrinsic neuroprotective efforts of the immune response to the detrimental effects of neuroinflammation . . . on the other, it has been suggested that neuroinflammation contributes to the neuroprotective regenerating efforts of the brain.'⁵

Inflammation is in fact a common feature in a variety of nervous system disorders, including multiple sclerosis, Alzheimer's disease,⁶ epilepsy⁷ and headaches.⁸ In this issue of *AFP*, Makdissi, Davis and McCrory⁹ provide an update of guidelines for the management of sports-related concussion in general practice. Beran¹⁰ provides an approach to the management of chronic headaches. Tan¹¹ discusses recent advances in the management of epilepsy, and Ahmed, Apen and Endean¹² focus on the specific problem of epilepsy management in pregnancy.

Fire and inflammation are part of our natural environment, and may be beneficial or detrimental. While many victims of trauma, whether physical or psychological, are able to make full recoveries, others are not so fortunate. Traumatized individuals and communities may face a lifetime of consequences,

consequences that persist long after the media spotlight has moved on. These patients require ongoing treatment and support from healthcare practitioners, community and family, to enable them to function to the best of their ability and encourage them to never 'abandon all hope'.

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