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The psychosocial, endocrine and immune consequences of caring for a child with autism or ADHD

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Summary Research that has assessed the psychophysiological consequences of caregiver stress in young and middle aged caregivers, that is, in populations not contending with age associated decline of the endocrine and immune systems, has been scarce and yielded inconsistent findings. To extend work in this area, this study assessed the psychosocial, endocrine and immune consequences of caregiver stress in a cross sectional sample of young and middle aged caregivers of children with autism and attention deficit hyperactivity disorder (ADHD) compared against parents of typically developing children. Caregivers ($n = 56$) and parent controls ($n = 22$) completed measures of psychological distress (perceived stress, anxiety/depression), social support and physical health complaints. To capture important indices of the diurnal cortisol pattern, cortisol was measured at waking, 30 min post waking, 1200 h and 2200 h on two consecutive weekdays. Venous blood was taken to assess systemic concentrations of proinflammatory biomarkers, interleukin-6 (IL-6) and C-reactive protein (CRP). Caregivers scored markedly higher on all measures of psychological distress; scores on social support subscales, however, were significantly lower in this group. Diurnal patterns of cortisol secretion did not differentiate between the groups; however, caregivers displayed elevated systemic concentrations of the proinflammatory biomarker, CRP and reported more frequent episodes of physical ill health. The stress of caregiving exacts a significant psychophysiological toll, that is, even in the absence of HPA dysregulation, caregivers demonstrated elevated concentrations of proinflammatory biomarkers and, therefore, might be at greater risk for diseases fostered by disinhibition of the inflammatory response.

1. Introduction

To assess the psychophysiological consequences of chronic stress, the caregiver control model has focussed, in the main, on older caregivers of spouses with degenerative disease. Compared with age matched controls, elevated psychologi-

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cal distress and dysregulation of the endocrine and immune systems have been consistently demonstrated in older populations (Kiecolt-Glaser et al., 1996; Vedhara et al., 1999; Bauer et al., 2000; Gallagher-Thompson et al., 2006; von Kanel et al., 2006; Gallagher et al., 2009). For a more comprehensive review regarding the psychophysiological consequences of caregiver stress in older caregivers, refer to Lovell and Wetherell (2011). As a function of their advancing age, older caregivers experience endocrine and immune senescence, that is, a natural dysregulation of the endocrine system and down regulation of the cellular immune response (Bauer, 2005). To better model the link between caregiver stress and disease risk, researchers have begun to investigate the psychophysiological consequences of caregiver stress in parents of medically fragile children, that is, in populations not contending with age associated decline of the endocrine and immune systems (Miller et al., 2008; Gallagher et al., 2009; Rohleder et al., 2009). In the same way that older caregivers can expect the stress of caregiving to last an average, 3—15 years (Vitaliano et al., 2003), parents of medically fragile children can expect the economic and psychosocial demands of caregiving to extend into the late adulthood of the child (Kuster and Merkle, 2004).

Research that has assessed the psychophysiological consequences of caregiver stress in young and middle aged populations has been scarce and yielded inconsistent findings. The majority of research has focussed on caregivers of patients experiencing severe physical impairments such as, multiple sclerosis (that includes some cognitive and personality changes) and breast cancer (Vedhara et al., 2002; Cohen et al., 2002; Cohen and Pollack, 2005). Research has noted that antibody response to influenza vaccination could not differentiate young and middle aged caregivers of patients experiencing multiple sclerosis from age matched controls (Vedhara et al., 2002). From these findings, it might be concluded, therefore, that it is the interaction between caregiver stress and caregivers' advancing age that dictates whether the stress of caregiving becomes an issue for immunity, that is, efficacy of the humoral immune response is preserved in young and middle aged caregivers not contending with immune senescence. More recently, however, research has demonstrated that, compared with parents of typically developing children, young and middle aged caregivers of children experiencing the same kinds of severe cognitive and behavioural impairments (i.e., Down's syndrome) that characterise older dementia patients demonstrated poorer antibody response to pneumococcal vaccination (Gallagher et al., 2009). Compared with other caregiver populations, depression and psychological burden are greater and, therefore, the experience of caregiving markedly more intense in caregivers of patients experiencing severe cognitive and behavioural impairments (Ergh et al., 2002; Vedhara et al., 2002; Pinquart and Sorensen, 2003). Rather than immune senescence, specific characteristics of the care recipient and concomitant variations in the intensity of the caregiving experience, therefore, seem to dictate whether the stress of caregiving becomes an issue for immunity (Gallagher et al., 2009).

The allostatic load model posits that stress responsive systems that mediate adaptive cardiovascular, metabolic and immunological changes in the face of fight/flight emergencies, can, if chronically activated, cause cumulative wear and tear on target cells in ways that foster increased risk for deleterious health outcomes (McEwen, 2003). Typically, basal HPA activity displays a robust diurnal pattern; levels of cortisol rise between waking and 30—45 min post waking (cortisol awakening response, CAR), decline across the day (diurnal cortisol slope) and reach a trough at around midnight (Smyth et al., 1997; Hucklebridge et al., 1998). As one index of allostatic load, disrupted patterns of cortisol secretion have been observed in young and middle aged caregivers of patients with acquired brain injury (Turner-Cobb et al., 2010). In support of the allostatic load model, the GC resistance hypothesis postulates that, as a function of persistent hypersecretion of cortisol, immune cells become functionally resistant to GC mediated signalling. Cortisol, therefore, is less able to effectively suppress proinflammatory transcriptional control pathways (Miller et al., 2002; Raison and Miller, 2003; Rohleder et al., 2009). Research has demonstrated how, as a function of GC resistance and concomitant disinhibition of the proinflammatory cascade, caregiver stress augments normal age related elevations in proinflammatory cytokines in older caregivers. In particular, findings from a six year longitudinal study revealed that, compared with age matched controls; concentrations of IL-6 were four times higher in older caregivers of dementia patients (Kiecolt-Glaser et al., 2003). Commensurate with these findings, elevated concentrations of IL-6 have been observed in other older caregiver populations (Lutgendorf et al., 1999; von Kanel et al., 2006). Cortisol hypersecretion, reduced immune system GC sensitivity and elevated concentrations of the systemic proinflammatory biomarkers, IL-1 and CRP have also been observed in young and middle aged caregivers of children with aggressive brain cancer (Miller et al., 2008; Rohleder et al., 2009). Relative to age matched controls, caregivers might, therefore, be at greater risk for conditions sensitive to disinhibition of the inflammatory response, including cardiovascular disease, type II diabetes and disorders of the musculoskeletal system (Pradhan et al., 2001; Ridker et al., 2003; Tak et al., 2009). Moreover, proinflammatory cytokines signal the brain to induce non specific symptoms of sickness such as malaise, nausea, headache, listlessness, fatigue, and hyperalgesia (Dantzer, 2001) via vagal nerves or leaky regions of the blood brain barrier (Dantzer et al., 2008).

Young and middle aged caregivers of patients with traumatic brain injury report feeling isolated from social support networks (Marsh et al., 1998); moreover, an inverse relationship between chronicity of caregiving and availability of social support has been demonstrated (Kiecolt-Glaser et al., 1991). Elevated psychological morbidity and reduced sensitivity of the immune system to the immunosuppressive effects of cortisol has been demonstrated in young and middle aged caregivers that reported diminished availability of social support (Ergh et al., 2002; Miller et al., 2002). It, therefore, becomes increasingly relevant to assess social support, in order that we learn more about how the availability of family and friends might mediate changes in disease trajectories.

This study is the first to assess the psychosocial, endocrine and immune consequences of caregiver stress in a cross sectional sample of young and middle aged caregivers of children experiencing autism and attention deficit hyperactivity disorder (ADHD) compared against parents of typically