The Behavioural and Psychological Symptoms of Dementia

Behavioural and psychological disturbances are often the most disabling and distressing symptoms of dementia for patients and their carer-givers. The behavioural and psychological symptoms of dementia (BPSD) include anxiety, depression and irritability; euphoria and disinhibition; and psychiatric symptoms such as delusions or hallucinations.¹ Because these symptoms can drastically alter a patient’s personality, and because they present in distressing and unpredictable ways, BPSD can be highly confusing and stressful for patients, their love ones and their care-givers. It is estimated that 99% of patients with dementia have behavioural and psychological symptoms. The severity and combination of symptoms varies depending on the dementia diagnoses.² Despite this high prevalence, BPSD are less researched and less relied upon in clinical diagnoses than cognitive symptoms.³ Better understanding and characterisation of BPSD in dementia will allow more focused care, better pharmacological treatment, more accurate prognosis of symptom progression and better prepare care-givers and loved ones for dealing with highly distressing symptoms.

The biological bases of BPSD are not well understood. Because of this, pharmacological treatments have had limited efficacy and carry significant side effects in most patients.⁴ BPSD are associated with some of the most complex human behaviours, which probably explains why trying to discover where in the brain they originate has been so difficult. The cognitive symptoms of dementia have been well studied because their neuroanatomical basis is often more straightforward to identify. For example, memory is associated with the medial temporal lobes; well-known memory centres in the brain. If memory deficits are seen in dementia, the
medial temporal lobes will likely exhibit impaired processing. Indeed, atrophy in these regions is associated with degree of memory impairment, and a good early marker of dementia\textsuperscript{5}. Behavioural and psychological symptoms, on the other hand, are much less clearly defined and their neuroanatomical correlates much less well established.

Complex behaviours relating to mood, emotion and decision-making have traditionally been associated with the frontal lobes, a potential neural correlate of BPSD. The frontal lobe is thought to have a number of functional subdivisions. But the evidence has been extremely mixed as to which regions subserve which specific functions\textsuperscript{6,7}. Recent advances in our understanding of the brain suggest regions do not work in isolation and behaviours are better explained by the joint activity of a number of regions working in unison. Even when the brain is not engaged in a specific task, these regions are working in synchronised networks, each responsible for different cognitive and behavioural functions. Networks can be mapped using brain scans that are ideal for studying patients because they are short, non-invasive and do not put pressure on patients to perform a task. Patients are scanned awake, but at rest, in a magnetic resonance imaging (MRI) scanner, and blood flow changes as the result of neural activity are detected. The diffusion of water in brain tissues can also be detected, in a separate MRI scan, to get a detailed picture of the brains structural connections.

Mapping the connections in the human brain, termed the ‘connectome’, is the next great scientific challenge, analogous to the challenge of sequencing the genome. Just as genetic markers provide predictors of disease, to enable early intervention or targeted drug treatment, brain connectivity changes may act as predictors of neurological disease and aid targeting of effective drug treatment and early intervention. For example, disruptions to networks associated with emotional processing may underlie many of the depressive symptoms of dementia. These techniques have already been successfully applied to complex behavioural disorders such as schizophrenia and autism\textsuperscript{8}. Changes to the default mode network, a network of regions active in synchrony in the resting state, are an early and reliable marker of Alzheimer’s Disease.\textsuperscript{9} Atrophy in the brain, seen as reductions in the volume of brain regions relative to healthy individuals of a similar age, also occurs in networks.
These networks of neurodegeneration, which vary depending on the type of dementia, are highly similar to well established functional networks in healthy individuals.\textsuperscript{10,11} This suggests neurodegeneration seen in dementia targets specific networks, which have functional relevance.\textsuperscript{10} This important finding shows that neurodegeneration, which is a hallmark of dementia, is not random but highly specific and behaviourally relevant.\textsuperscript{10} It also shows the potential of advanced brain imaging methods in characterising and understanding the biological basis of dementia.

Behavioural and psychological symptoms are pervasive and highly prevalent in dementia. The symptoms are distressing and burdensome for patients and their care-givers and represent over a third of the cost of dementia care. Understanding their significance, recognizing their impact, and effectively treating them will require an understanding of their biological basis which recent advances in brain imaging can provide.

References:

1. Finkel S. Introduction to behavioural and psychological symptoms of dementia (BPSD).


