The 20th century witnessed an unprecedented growth in the population of older adults in the United States. Estimates suggest that this trend will continue, with the number of persons aged 65 and older increasing from 35 million in 2000 to 72 million in 2030.\textsuperscript{1} At the same time, the national incidence of diabetes will continue to rise, especially among older adults.
In 2010, approximately 27% of older adults suffered from some form of diabetes. The Centers for Disease Control and Prevention estimates that by 2030, diabetes will affect 53% of older adults. Unfortunately, diabetes does not operate in isolation; as its rate doubles among older adults, physicians can expect to see a marked increase in the well-documented correlates of the disease. Chief among these comorbid conditions is depression, the debilitating effects of which are twice as common among patients with diabetes as in their nondiabetic counterparts.3

This convergence of diabetes, depression and aging poses a formidable challenge for primary care physicians. By the time adults reach their senior years, they are likely to have experienced one or more effects of normal aging: sensory decline, reduced metabolic efficiency, decreased muscle mass, declining renal efficiency, mild cognitive changes, slowed reaction time and dwindling levels of familial and social support. The addition of diabetes, whether newly acquired or carried over from younger adulthood, greatly diminishes quality of life, amplifies age-related changes and accelerates micro- and macrovascular deterioration.4,5 Comorbid depression further complicates this clinical picture by catalyzing the progression of existing medical conditions, reducing treatment adherence and disease self-management and increasing mortality.4,6,7 Unlike depression in early to mid adulthood, geriatric depression manifests with subtler and often different symptoms that are frequently obscured by concomitant medical conditions.8,9

This article addresses the complex interplay of diabetes and depression in older adulthood. It reviews the current literature in this area, focusing on the unique clinical manifestations of late-life depression and the challenges of identifying it amid interrelated and overlapping medical illnesses. Finally, it discusses appropriate treatment options for older adults suffering from diabetes and depression.

### Depression in older adulthood

Estimates suggest that depression affects approximately 2% to 12% of community-dwelling older adults.7,10 At first, these rates are no different from those observed in younger populations.8,11 The literature suggests, however, that these numbers grossly underestimate the true prevalence of depression in older adults.7,11

Geriatric researchers and clinicians have identified several features unique to older adulthood that may mask the full scope of geriatric depression and contribute to its underdiagnosis. Relative to depression in younger populations, depression in older adults often presents with atypical signs and symptoms, follows a slower and more varied clinical course and is highly intertwined with the progression of comorbid medical conditions.10,12

Four primary types of depression affect older populations: major depressive disorder (MDD), dysthymic disorder, subsyndromal depressive symptoms and vascular depression.

### Major depressive disorder and dysthymia

The literature on geriatric mental health reflects a growing consensus that the conventional diagnostic criteria for depression, as outlined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), do not fully capture the complexities of late-life depression.7,11 MDD and dysthymic disorder, for example, are equally prevalent in younger and older adulthood, with MDD affecting 1% to 4% and dysthymia occurring in 4% to 6% of geriatric outpatients. Although the signs and symptoms of MDD and dysthymia look similar in younger and older adults, their correlates, antecedents and outcomes differ in the two age groups.

MDD, for example, is arguably one of the more obvious, albeit infrequent, manifestations of geriatric depression. The severity of geriatric depressive symptoms and their virtual equivalence to MDD in younger adults render it more visible to clinicians, caretakers and families. Nevertheless, several distinctions should be noted. First, older adults are less likely to endorse the affective symptoms of MDD or dysthymia, presenting instead with apathy, anhedonia and diffuse somatic complaints.9 Older adults with MDD are more likely to develop cognitive impairments and mood-related psychotic features than their younger counterparts.13 Moreover, MDD in later life may follow an extended period (2-3 years) of undetected, subthreshold depressive symptoms.11 The prognosis of MDD in older adulthood is associated with greater rates of functional disability, shorter periods of recovery between episodes and greater lethality of suicide attempts.13,14

### Subsyndromal depressive symptoms

Older adults presenting with mood symptoms are typically diagnosed with MDD or dysthymia; physicians often note, however, that neither diagnosis captures geriatric depression particularly well.

A growing body of clinical research suggests that a sizable subset of older adults presents with subthreshold, but highly debilitating, depressive symptoms.7,11 The constellation of signs and symptoms characterizing subsyndromal depression includes two to five symptoms of MDD, evidence of functional impairment or clinical distress, somatic problems that are distinct from existing medical conditions and a late age of onset (i.e., no history of MDD or dysthymia prior to age 60 years).7 Not surprisingly, these subsyndromal forms of depression defy easy detection. Physicians and other care providers may misattribute these subtle, more diffuse symptoms to the effects of life stressors, medical illnesses or both.

### Vascular depression

Physicians have long recognized that late-life depression and physical illness are intimately connected.12,15 A promising new development in geriatric medicine, however, is the elaboration of specific mechanisms
that link the atypical features of depression in older adults to specific neuroanatomic substrates.

A growing body of research suggests that older adults with late-onset depression may present primarily with neurocognitive and somatic symptoms rather than sad mood or distress. Several magnetic resonance imaging studies of depressed and euthymic older adults have implicated ischemic changes in the brain with late-onset depression. The resulting syndrome, termed vascular depression, is characterized by apathy, subcortical dysfunction, cognitive impairment, disability and the neurovegetative symptoms of depression that occur in the relative absence of mood symptoms.\textsuperscript{8,11,16}

Although research on vascular depression is nascent, preliminary findings suggest an association with poorer treatment outcomes and more rapid progression of comorbid medical conditions than is seen in early-onset and nonvascular manifestations of depression.\textsuperscript{17,18}

**Geriatric depression and diabetes**

The vascular depression hypothesis was born from the striking association observed among stroke, cardiovascular disease and clinical depression. In general, the co-occurrence of physical illness and mood symptoms is particularly pronounced in older populations. Depression in older adulthood rarely occurs in isolation; the effects of aging, in conjunction with the progression of chronic illnesses, most likely exert a multidirectional influence on mood, mental health and quality of life.\textsuperscript{7}

Diabetes is one such chronic illness that is common among older adults and may share a close relationship with depression.\textsuperscript{3} Indeed, an accumulating body of research suggests that depression and diabetes are intimately related—both in the general population and among older adults.\textsuperscript{4,19} The micro- and macrovascular changes associated with poor glycemic control suggest that diabetes may predispose individuals to vascular depression later in life.\textsuperscript{4,19}

Adults who enter their senior years with a history of chronic hyperglycemia may have vascular tissue damage, increased amyloidal deposition, and impaired neurotransmitter functioning that leave them susceptible to mood disturbances and cognitive impairment.\textsuperscript{4}

Diabetes and depression can adversely affect health independently and conjointly. For example, older adults with depression alone are at risk for developing cognitive impairments, executive dysfunction and dementia as they age.\textsuperscript{4,11} Similarly, adults with diabetes have a 60% greater risk of cognitive impairments than nondiabetic adults.\textsuperscript{4} Taken together, it is reasonable to assume that older adults with diabetes and comorbid depression are at an even higher risk for cognitive dysfunction than those with depression or diabetes alone.

Diabetes and depression may also interact to impair treatment adherence and self-care in older adults.\textsuperscript{20} The fatigue and general malaise associated with hyperglycemia restrict the ability
of people with diabetes to seek care. Depressive symptoms such as avolition, hopelessness and low energy demotivate individuals to initiate or maintain medical treatment. Almost 30% of all diabetic patients, for example, may refuse insulin.\textsuperscript{21,22} Several studies have identified an association between depressive symptoms and negative appraisals of insulin therapy.\textsuperscript{21,23}

In one investigation, as many as 65% of insulin-naive patients with type 2 diabetes endorsed the belief that the need for insulin therapy is a sign of personal failure.\textsuperscript{21} These findings suggest potential ways in which depression and chronic illness conspire to promote poor health outcomes: negative insulin appraisals, for example, may precipitate insulin refusal. Insulin refusal, in turn, may set the stage for poor glycemic control. Chronic glycemic dysregulation may catalyze the micro- and macrovascular changes that give rise to vascular depression, reduced quality of life and mortality.

Regardless of the mechanisms of interaction, depression and chronic illnesses exert cumulative and potentially severe effects on quality of life, health and longevity. To interrupt this cycle, physicians must accurately identify signs of depression in their chronically ill patients and intervene accordingly.

**Identifying and monitoring geriatric depression**

Early identification is the cornerstone of effective disease management. This is especially true for older adults; the ability to recognize early signs of mood symptoms increases the chances of timely intervention and may reduce or prevent the risks of physical disability, rapid progression of medical conditions and other poor outcomes characteristically associated with geriatric depression.\textsuperscript{11} As many as 75% of geriatric patients who commit suicide have seen a primary care physician in the month before their death, and almost 39% were seen in the week prior. These sobering statistics demonstrate the frequency and price of missing depressive symptoms in older patients.

A major challenge to the accurate diagnosis of geriatric depression is that mood symptoms often occur within the context of chronic illness. In such cases, older adults are less likely to report the most prominent symptoms of depression (depressed mood or sadness) and instead exhibit increased somatic problems, avolition, apathy and neurocognitive disturbances. The absence of overt mood symptoms, however, makes it easy for providers to misattribute signs of depression to symptoms of chronic illness.

Several self-report screening instruments have been designed to assist health care providers in identifying depression in older and chronically ill populations. The Beck Depression Inventory-Fast Screen (BDI-FS) is a seven-item self-report questionnaire designed to identify depressive symptoms in medical patients. Unlike its lengthier counterpart, the BDI-II, the BDI-FS focuses on the affective and cognitive features of depression and omits the somatic symptoms that may overlap with medical illnesses.\textsuperscript{24}

Another popular screening tool is the Geriatric Depression Scale-15 (GDS-15), a brief version of the traditional 30-item scale. The GDS-15 presents 15 yes-and-no questions that elicit nonsomatic symptoms of depression and has been used widely in geriatric inpatient and outpatient settings.\textsuperscript{25} Both questionnaires are sufficiently sensitive and specific in discriminating depressed from nondepressed patients and are easy to administer, score and interpret. Given the strong association between dysphoria and cognitive impairment in older adults, physicians may also supplement depression screening measures with a short-version of the Mini-Mental State Examination (MMSE) to track the parallel progression of mood and neuropsychological functioning.

**Treatment and management**

Once depression is identified, how do physicians determine whether it is secondary to, or distinct from, concomitant illnesses such as diabetes? The *DSM-IV* stipulates that a mood disorder cannot be diagnosed as such if its symptoms are better accounted for by the effects of a medication, substance or disease process.\textsuperscript{26} At the same time, a subset of criteria for depression consists of somatic symptoms, including changes in appetite, sleep disturbance and fatigue.\textsuperscript{11} With concomitant diabetes and depression, for example, how

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**Take-home points**

**Pharmacologic treatments for depressed older adults**

First-line therapies for MDD, dysthymia, and subsyndromal depression in older adults include the selective serotonin reuptake inhibitors (SSRIs), especially:

- citalopram
- escitalopram
- sertraline

To maximize treatment effects, physicians may wish to:

- reduce the initial dose of citalopram and escitalopram due to their reduced clearance and prolonged elimination half-life in older adults;
- prescribe extended-release preparations to promote better adherence.

For vascular depression, antidepressants that act on norepinephrine/dopamine may be beneficial, including:

- duloxetine
- bupropion

In older adults, only secondary amine tricyclic antidepressants (TCAs) are recommended, including:

- nortriptyline
- desipramine

Tertiary amine TCAs (amitriptyline) are not recommended.

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**Watch DOs Against DIABETES**

Identifying and monitoring geriatric depression

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Once depression is identified, how do physicians determine whether it is secondary to, or distinct from, concomitant illnesses such as diabetes? The *DSM-IV* stipulates that a mood disorder cannot be diagnosed as such if its symptoms are better accounted for by the effects of a medication, substance or disease process.\textsuperscript{26} At the same time, a subset of criteria for depression consists of somatic symptoms, including changes in appetite, sleep disturbance and fatigue.\textsuperscript{11} With concomitant diabetes and depression, for example, how
should physicians proceed? How can one disentangle mood and somatic symptoms when the two so frequently co-occur in both disorders? Under which circumstances do somatic symptoms “belong” to depression rather than coexisting diabetes? And how might this affect treatment?

In one sense, these questions are unanswerable and evoke a chicken-and-egg situation not yet resolved in the literature.12,20,27 These questions may also lack clinical significance; some speculate that regardless of etiology and onset, comorbid illnesses exert a “domino effect” on an older adult’s health. A disturbance or exacerbation of one illness can precipitate a rapid downward spiral in the progression of another health. A disturbance or exacerbation of one illness can precipitate a rapid downward spiral in the progression of the other.7,11

**Antidepressant medications**

Selective serotonin reuptake inhibitors (SSRIs) are the first line of treatment for moderate to severe depression in older patients (see page 18).10 Relative to other antidepressants, SSRIs are associated with fewer adverse effects and generally do not increase cardiac risk in older patients.11

Although most SSRIs have demonstrated similar efficacy, the pharmacokinetic profiles of citalopram, sertraline and escitalopram may be particularly well-suited for geriatric populations because they have favorable side-effect profiles and do not adversely alter cognition.11 Some SSRIs, including citalopram and escitalopram, have reduced clearance and prolonged elimination half-life in older adults. Physicians may need to reduce the initial dose of these medications by as much as half.7,11

For vascular depression, physicians may consider second-line antidepressant therapies that enhance ischemic recovery via dopamine and/or norepinephrine, including duloxetine and bupropion. Some evidence suggests that duloxetine relieves pain associated with diabetic neuropathy, although findings have been equivocal.28 It is important to note, however, that these agents may be contraindicated for older patients with heart disease.13

Tricyclic antidepressants (TCAs) are also efficacious for treating late-life depression. Relative to SSRIs, however, TCAs have a broader range of side effects that make them less appropriate for older adults. These include anticholinergic effects, mental confusion, orthostatic hypotension and tachycardia. In addition, TCAs are highly lethal, making them a poor choice for severely depressed and suicidal adults.11 Secondary amine TCAs, such as nortriptyline and desipramine, have fewer adverse effects than other TCAs and are reasonable second-line therapies if SSRIs are ineffective. Tertiary amine TCAs such as amitriptyline have much broader and more intense adverse effects and are therefore not recommended for geriatric patients.11

In addition, psychotic symptoms are more frequent among older adults with MDD than in their younger counterparts. These more severe forms of depression often require antidepressant medications to be supplemented with an atypical antipsychotic. For older adults with diabetes, however, atypical agents may exacerbate hyperglycemia, dyslipidemia, and metabolic weight gain.11

**Electroconvulsive therapy**

Despite its reputation in popular culture, electroconvulsive therapy (ECT) is a safe, effective and well-tolerated treatment option for severe depression.8,11 Somewhat surprisingly, ECT is particularly efficacious in the oldest adults, despite their increased frailty and higher rates of comorbid illnesses.29 The side effects of ECT, most notably delirium and amnestic disturbances, are transient in older adults.8

For geriatric populations, ECT may be equally, if not more, efficacious than antidepressant medications, although more research is needed for confirmation.20 Electroconvulsive therapy may be the most viable treatment option for severely depressed older adults with diabetes.

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**Geriatric Depression Scale**

1. Are you basically satisfied with your life? [ ] Yes [ ] No
2. Have you dropped many of your activities and interests? [ ] Yes [ ] No
3. Do you feel that your life is empty? [ ] Yes [ ] No
4. Do you often get bored? [ ] Yes [ ] No
5. Are you in good spirits most of the time? [ ] Yes [ ] No
6. Are you afraid that something bad is going to happen to you? [ ] Yes [ ] No
7. Do you feel happy most of the time? [ ] Yes [ ] No
8. Do you often feel helpless? [ ] Yes [ ] No
9. Do you prefer to stay at home, rather than going out and doing things? [ ] Yes [ ] No
10. Do you feel you have more problems with memory than most? [ ] Yes [ ] No
11. Do you think it is wonderful to be alive now? [ ] Yes [ ] No
12. Do you feel pretty worthless the way you are now? [ ] Yes [ ] No
13. Do you feel full of energy? [ ] Yes [ ] No
14. Do you feel that your situation is hopeless? [ ] Yes [ ] No
15. Do you think that most people are better off than you? [ ] Yes [ ] No

**TOTAL SCORE**

This quiz is scored by allocating 1 point to each ‘depressive’ answer, where the answer associated with depression is ‘yes’ for questions 2, 3, 4, 6, 8, 9, 10, 12, 14, and 15 and ‘no’ for questions 1, 5, 7, 11, and 13. Screening test scoring ranges: 0 to 4, Normal Range; 5 to 8, Mild Depression; 9 to 11, Moderate Depression; and 12 to 15, Severe Depression.
Psychotherapy
Psychotherapy is effective in treating depression in older adults alone or conjointly with antidepressant medications.8 Two broad forms of psychotherapy are particularly relevant for depressed older adults with diabetes: cognitive-behavioral interventions that promote medication adherence and better self-care, and interpersonal psychotherapy (IPT).

Cognitive behavioral therapy (CBT) may be useful in correcting depressogenic thinking and negative attributions about health that may adversely affect diabetes treatment adherence. Cognitive behavioral therapy for patients with medical illnesses often combines education, problem-solving skills, and exercise prescriptions to address mood and health-related symptoms. For older adults, therapies that target diabetes self-management skills, as well as negative attributions associated with the progression of diabetes, may be particularly beneficial and may prevent or reduce disease-related disability.30

Interpersonal psychotherapy is a time-limited, problem-focused therapy that locates depressive symptoms within the context of interpersonal relationships. Interpersonal psychotherapy addresses depression that arises from four focal areas: interpersonal disputes, role transitions, complicated bereavement and interpersonal deficits.31 These problem areas are particularly relevant to the psychosocial changes occurring in older adulthood. Not surprisingly, IPT has been deemed efficacious for older patients suffering from depression.32

Older adults may respond favorably to a variety of psychotherapeutic interventions, but recent research suggests that the treatment setting is an important consideration as well. Mental health treatment offered in primary care settings enhances outcomes and improves physician identification of depression in older patients.30 Integrated behavioral medicine and primary care offer the benefits of “one-stop shopping” and closer collaboration among treatment providers.

References

Take-home points
Identifying geriatric depression
Older adults tend to exhibit a different set of depressive symptoms than younger adults. Rather than endorsing symptoms of a depressed mood or emotional distress, older adults may endorse:
- increased somatic symptoms
- apathy
- anhedonia
- irritability
- cognitive impairments
- social withdrawal and isolation
- decreased treatment adherence.

Interpersonal psychotherapy addresses depression that arises from four focal areas: interpersonal disputes, role transitions, complicated bereavement and interpersonal deficits. These problem areas are particularly relevant to the psychosocial changes occurring in older adulthood. Not surprisingly, IPT has been deemed efficacious for older patients suffering from depression. Older adults may respond favorably to a variety of psychotherapeutic interventions, but recent research suggests that the treatment setting is an important consideration as well. Mental health treatment offered in primary care settings enhances outcomes and improves physician identification of depression in older patients. Integrated behavioral medicine and primary care offer the benefits of “one-stop shopping” and closer collaboration among treatment providers.

Final notes
Because older adults account for an increasing proportion of the demographic landscape, it is critical that primary care medicine grows in tandem to meet the unique needs of this population. In addition to the issues of normal aging, physicians will need to address the rising number of chronic illnesses that afflict senior citizens, the expansion of diabetes and its complications, and increasingly pervasive levels of depression among older patients.

Geriatric primary care requires physicians to accurately identify early signs of disease processes; distinguish among overlapping somatic, neurobiologic and psychological symptoms; maintain a simultaneous focus on individual symptoms and their combined effects; and identify holistic and multisystemic treatment options—in other words, practice the hallmarks of osteopathic medicine.

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