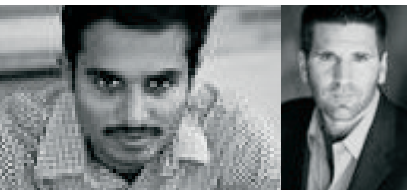
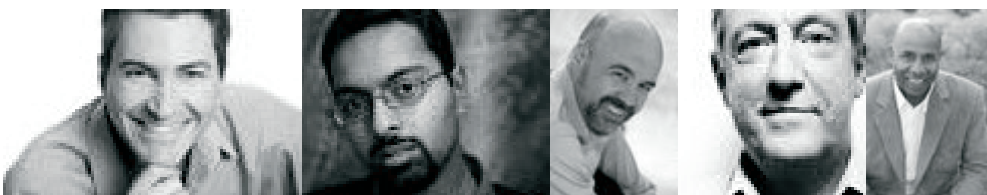




American Association
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Men's Health, Low Testosterone and Diabetes: Individualized Treatment and a Multidisciplinary Approach



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A panel of experts recently convened in Chicago to explore the issues surrounding low testosterone (low T) in men with diabetes. The panel discussion focused on the screening and diagnosis of low T, treatment options, and barriers to assessment and treatment. Other topics addressed by the panel included strategies for communication between patient and provider, patient education, the role of the diabetes educator, and the importance of individualized treatment and a multidisciplinary approach. The following is a summary of the panel dialogue.

Introduction

Testosterone is a cholesterol-based steroid hormone that plays a critical role in numerous biological functions throughout the male life cycle.^{1,2} Advancing age is well recognized as a cause of reduced serum testosterone levels.³ Indeed, after age 30 years, the average annual decline in serum testosterone in men is about 1% to 2%.^{4,5} Testosterone decline is also associated with numerous comorbidities⁵ and reduced survival.⁶ Notably, men with diabetes have been shown to have substantially lower testosterone levels than men without diabetes.⁷

Many men with diabetes who have low T remain undiagnosed and untreated due to a variety of barriers, including lack of patient-provider communication; lack of patient awareness; patient embarrassment; inadequate assessment tools or provider knowledge; personal, cultural, or gender issues; a focus on acute care; and the current structure of diabetes education programs. Diabetes educators can play an important role in screening for low T, providing information to patients, and increasing awareness among primary care physicians (PCPs) for the need to address men's sexual health and implement appropriate treatment. Testosterone replacement therapy may be a viable option in some men with diabetes who have low T.

Definition and Signs/Symptoms of Low T and Hypogonadism

The expert panel concluded that low T is generally defined as a total testosterone (TT) level of ≤ 300 ng/dL. Testosterone secretion varies diurnally, thus measuring TT in the morning, usually between 8:00 AM and 11:00 AM, is preferred to other times of the day.^{2,8} If TT findings are at or below threshold, a second confirmatory test should be performed before initiating testosterone replacement therapy.⁵

Most clinically oriented professional organizations (e.g. The Endocrine Society, The American Society of Andrology, The Canadian Society for the Study of the Aging Male) suggest that a low T level should be part of the diagnosis of hypogonadism,⁹ a clinical syndrome caused by the failure of the testes to produce physiological levels of testosterone and adequate spermatozoa.¹⁰ Nonetheless, guidelines are inconsistent with regard to the level of TT that defines hypogonadism.^{4,11} The definition suggested by the American Association of Clinical Endocrinologists for hypogonadism is a testosterone level of <200 ng/dL.^{4,12}

The signs and symptoms of hypogonadism may be vague or nonspecific and can vary according to age at the time of onset.⁵ The following indicators of hypogonadism were identified by the panel: erectile dysfunction (ED), reduced or absent libido, depression, decreased bone mineral density, decreased lean body mass, increased body fat, fatigue, and a diminished sense of overall well-being.

Screening for and Diagnosing Low T

Three screening instruments—the St. Louis University Androgen Deficiency in Aging Male (ADAM) questionnaire, the Aging Male Survey, and the Massachusetts Male Aging Study—are available to aid physicians in the diagnosis of hypogonadism.¹³ In addition, ANDROTEST, a structured 12-item interview designed specifically for the screening of hypogonadism in men with sexual dysfunction,¹⁴ may be of particular value in men with diabetes who have ED. Notably, ED occurs more often and has been shown to be more severe in men with diabetes than in those in the general population.¹⁵ Several sets of general guidelines with recommendations on the diagnosis and treatment of low T and hypogonadism are also available, including those of the American Association of Clinical Endocrinologists¹²; the

Endocrine Society¹⁰; and the International Society of Andrology, International Society for the Study of the Aging Male, and European Association of Urology.¹⁶ Diabetes educators are the front line and can help by recommending that patients be screened.

Link Between Low T and Diabetes

Low serum testosterone is associated with a variety of comorbidities, including insulin resistance,^{7,17} type 2 diabetes,^{3,5,17} obesity,³ metabolic syndrome,⁵ and cardiovascular disease.⁷ Insulin resistance is a critical “upstream driver” of hyperglycemia, hypertension, and hyperlipidemia,⁷ a key player in metabolic syndrome,¹⁸ and a risk factor for the development of type 2 diabetes.^{18,19} At present, the association between testosterone and insulin concentration has not been fully elucidated, thus whether the relationship between low T and diabetes is direct or indirect remains unknown.²⁰

Treatment Options for Low T

The main goals of testosterone replacement therapy are to restore physiologic testosterone levels and to reduce the symptoms of hypogonadism.⁵ Several forms of testosterone replacement therapy are available for use in the United States, including injectable, oral, buccal, and transdermal preparations.²¹ These formulations differ in numerous ways, such as ease of administration, patient preference, potential risks, and safety profiles.²¹

Testosterone injections are usually administered at a dose of 100 mg per week or 200 to 300 mg every 2 to 3 weeks.²¹ Serum testosterone levels peak 2 to 5 days after injection and usually return to baseline 10 to 14 days after injection.²¹ Disadvantages include injection pain and frequent office visits.²¹ Patients may also experience a “roller coaster” effect due to fluctuating testosterone levels (ie, alternating symptomatic benefit followed by a return to baseline symptoms).²¹ The risk of erythrocytosis also seems to be higher with testosterone injections than topical formulations.²¹ Advantages of injection therapy include high peak serum testosterone levels and low cost.²¹

Oral testosterone agents are rarely prescribed in the US due to the potential for adverse effects, primarily hepatotoxicity.^{4,21} A buccal tablet applied twice daily to the upper gum above the lateral incisors has been shown to achieve testosterone levels in the normal range.²²

Transdermal testosterone formulations include scrotal and nonscrotal skin patches and gel preparations, all of which are designed to deliver 5 to 10 mg of testosterone per day and require daily application.²¹ The main advantages of transdermal delivery include the maintenance of fairly uniform serum testosterone levels and ease of application. Conversely, some men may experience inadequate transdermal absorption, thereby reducing the value of this mode of testosterone delivery.²¹ Skin irritations are a common side effect of testosterone patch usage, but are uncommon with gel usage.²¹

Data are available on the potential advantages of testosterone replacement therapy on erythropoiesis and anemia, libido, mood and cognition, penile erection, cholesterol, fasting blood sugar, glycated hemoglobin, insulin resistance,²³ visceral adiposity,²⁴ and quality of life.⁴

Contraindications to Testosterone Replacement Therapy

Testosterone acts on a wide range of tissues and organs (eg, prostate, testes, breast, skin, and cardiovascular and respiratory systems),²¹ which may be especially vulnerable to the potential risks or adverse effects associated with testosterone replacement therapy.^{21,22}

The main contraindication to testosterone replacement therapy is suspected or known prostate cancer.^{5,22} Prior to initiating testosterone replacement therapy, providers should ensure that both digital rectal examination (DRE) of the prostate and prostate-specific antigen (PSA) testing are normal, especially in men aged 45 years and older.²² Follow-up DRE and PSA testing should be performed every 3 months during the first year of testosterone replacement therapy and annually thereafter.²²

Testosterone replacement therapy is also contraindicated in men with breast cancer.^{5,22} In addition, sleep apnea and social or mood disorders are considered to be relative contraindications to testosterone replacement therapy.⁵ Testosterone replacement therapy impairs spermatogenesis, thus should be administered with caution in men with fertility concerns.⁵ Finally, testosterone replacement therapy may cause an increase in hemoglobin and hematocrit, thus both levels should be routinely monitored²²; notably, polycythemia occurs most often in men receiving higher doses of testosterone.⁴

Barriers to Assessment and Treatment of Low T

The panel identified several barriers that could prevent the appropriate screening, diagnosis, and treatment of low T in men with diabetes, some of which can be traced to a general lack of communication between patient and provider. Many PCPs, for example, may be reluctant to address the topic of sexual health,²⁵ and men with diabetes may be too embarrassed to initiate the conversation. Furthermore, the onset of symptoms signaling a change in testosterone level can occur over an extended period of time, thus a male patient may be unaware that a change has occurred unless asked specific questions. One panel member suggested that the colloquialism, "Don't ask, don't tell," nicely encapsulates the root of the problem.

Gender barriers and cultural phenomena may also play a role in the failure to address low T, again at the level of communication. Female healthcare providers may not be comfortable discussing all aspects of sexual health with male patients, and "green flags" offered by male patients signaling sexuality concerns may go unnoticed due to a lack of awareness. Few culture-specific resources dealing with sexual health are available to PCPs who treat diverse communities, especially those with African American and Hispanic populations.

The panel also noted that some PCPs may attempt to assess sexual health by inquiring about ED, but do not ask specific questions about other parameters of sexual health or screen for low T. As a result, when a patient states that he is experiencing ED, a physician may be inclined to prescribe a phosphodiesterase-5 inhibitor, which does not address all of the physiological issues associated with low T. The panel therefore recommended that PCPs who treat men with diabetes broaden the scope of sexual health questions to more accurately screen for low T.

The panel acknowledged a shortage of screening/diagnostic tools and corresponding treatment protocols in men with diabetes who have low T. Members concurred that the lack of accurate assessment instruments could result in misdiagnoses and that the lack of a generally accepted therapeutic strategy could lead to treatment failure. An added confounding factor is that many of the symptoms of low T are also symptoms of diabetes, which could further complicate the diagnostic process. Once diagnosed, a patient with low T who might be a viable candidate for testosterone replacement could potentially go untreated. Some PCPs, for

example, may be reluctant to prescribe testosterone therapy in a patient with diabetes for fear of adverse cardiovascular or other effects.

The panel agreed that the focus of the current healthcare system on acute care also contributes to inadequate sexual health assessment in men with diabetes. Most of the time allotted for an office visit consists of reviewing diet, exercise, and blood glucose control and confirming the integrity of at-risk body systems,²⁶ whereas a discussion of sexual health rarely comes into play. Furthermore, given that a patient with diabetes often consults numerous healthcare professionals,²⁷ the potential exists for the mismanagement of patient information, protocol, or follow-up before an optimal course of treatment is identified and implemented.

Similarly, most diabetes education programs are structured and delivered in a way that also impedes adequately addressing sexual health. As in office visits, the effect of diabetes on the feet, eyes, kidneys, and vasculature is routinely addressed, whereas low T is not a usual topic of discussion. Relevant continuing education programs for PCPs are also needed to facilitate the proper management of patient sexual health concerns.²⁵

Communication Strategies

The panel identified four strategies to promote more effective communication between healthcare providers and men with diabetes with regard to sexual health. First, healthcare professionals should attempt to exhibit an appropriate degree of comfort with their own sexuality when asking questions of patients that may be perceived as being embarrassing or difficult. Panelists also agreed that generally if the patient senses comfort on the part of the provider, he in turn, will feel more comfortable discussing the topic. Second, it has been found that health care professionals are more effective if they are familiar with subtle cues that indicate the patient may have concerns about his sexual health. For example, a question such as, "Does diabetes affect your nature?" may be a verbal signal that a patient is suffering from any number of sexual side effects that could include loss of libido, difficulty achieving or maintaining an erection, or achieving climax. Recognizing the significance of the cue would enable the provider to further investigate all components of the patient's sexual health. The provider must also be aware of nonverbal and clinical assessment cues that could be suggestive of sexual health problems. Third, including a sexual partner in conversations about

sexual health could bring issues of dysfunction to the surface more quickly than communicating with the patient alone. Diabetes educators have expert at communication skills and can help to facilitate communication between health care providers and the patient. Finally, healthcare providers should attempt to normalize a patient's situation by individualizing sexual health conversations.

Patient Education: Realistic Expectations

Most men with diabetes who have low T are in mid-life or later, thus may not have been sexual for many years at the time of treatment initiation. In a sense, these men will be returning to sexual activity with a "different" body than the one they had during previous sexual encounters. Providers should therefore counsel such patients to take the time to adjust to the unique qualities of this "different" body and also to expect age-related changes. For example, achieving an erection or reaching orgasm may take longer than at a younger age, or more hands-on stimulation or foreplay may be needed as part of the sexual experience. If a patient's expectations are not age appropriate, he may conclude that the treatment has failed, which could lead to reduced compliance and effectiveness. Most importantly, patients should know that age-related changes are not reversed with testosterone therapy and that such therapy is not a panacea.

In discussing the potential benefits of testosterone therapy, the provider should explain that the patient may experience a rapid improvement in mood, energy, libido, and quality of erections in the initial weeks of treatment. Patients should also understand, however, that the initial rapid rate of change may plateau as the maintenance phase is entered. At this point, some patients may need an added reminder that testosterone therapy will not revive the sexuality experienced at a younger age and that diabetes may have caused long-term organ damage that could affect sexual performance. Providers should be aware of patient grief based on these realities and allow the natural grieving process to unfold.

Increasing Public Awareness

The influence of healthcare advertising in the mass media is indisputable. Television and print advertising for ED treatments are the most powerful factors at work in educating the public about sexual dysfunction. Unfortunately, these messages create an incomplete picture of sexual

dysfunction by isolating ED as the lone symptom. Increasing public awareness that diabetes and low T are commonly associated and dispelling the misconception that ED is the lone symptom of sexual dysfunction could potentially increase the likelihood that patients will discuss signs and symptoms with their healthcare provider.

Print materials about diabetes and sexual health made available to patients in provider or educator waiting rooms may help to encourage patients to broach the subject and/or respond to provider questions about the signs and symptoms of low T. The creation of entertaining, interactive, educational web sites specifically targeting men may also help to facilitate public awareness about the link between diabetes and low T.

Role of the Diabetes Educator

Diabetes is a complex chronic disease that requires numerous skills for optimal management.²⁸ Diabetes educators, who play a critical role in providing information to patients with diabetes, must be proficient in all areas of diabetes care, including the clinical assessment of comorbidities and complications.²⁸

Diabetes educators can serve to facilitate the identification of men with low T or hypogonadism through the use of a screening questionnaire, initiate conversations with the patient about the nature of the condition and potential treatment options, and refer patients to appropriate specialists for further assessment and management. A candid dialogue between patient and diabetes educator prior to testosterone replacement therapy may help to eliminate surprises and increase compliance, which could ultimately enhance treatment effectiveness.

Diabetes educators are also ideally positioned to increase awareness of low T and hypogonadism among healthcare providers with varying specialties, an important contribution given that a multidisciplinary team approach is essential to the effective management of sexual health issues in patients with diabetes.

At present, diabetes educators are not available in all facilities, and others are understaffed with only one or two educators. Additionally, many of the available diabetes educators are burdened with heavy caseload and administrative demands. Given the prevalence of low T and hypogonadism in men with diabetes, increasing the number of trained diabetes educators should be a top priority for delivering optimal comprehensive diabetes care. In addition, diabetes educators would also

benefit from developing additional skill sets and experience in the area of low T and diabetes.

Conclusions

Men with diabetes have been shown to have substantially lower testosterone levels than men in the general population, yet many remain undiagnosed and untreated due to a variety of well recognized social, cultural, educational, and/or communication barriers. Testosterone replacement therapy is available in several formulations (injectable, oral, buccal, and transdermal patches and gels) in the US and may be a viable option in some men with diabetes and low T or hypogonadism. The main contraindications to testosterone replacement therapy include suspected or diagnosed prostate cancer and male breast cancer.

More effective patient education and communication strategies must be implemented to ensure that sexual health issues are adequately addressed in men with diabetes, and a multidisciplinary team of professionals must be in place to ensure optimal comprehensive care. The diabetes educator can play a central role in screening for low T, providing patient education, and increasing awareness about low T and hypogonadism among healthcare providers. The current lack of diabetes educators, however, may compromise the delivery of diabetes care and should be explored to maximize outcome.

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