

whether symptoms correlate with bradycardia. If symptoms are clearly correlated, permanent pacing should be offered. If it is unclear, a trial of oral theophylline can be considered diagnostically. If there is no correlation between symptoms and bradycardia, then observation is appropriate. Class I recommendations should be performed or are indicated. Class IIa recommendations are considered reasonable to perform. Class IIb recommendations may be considered. Class III recommendations are associated with harm more than benefit. AV, atrioventricular; GDMT, guideline-directed management and therapy; PPM, permanent pacemaker; RV, right ventricular. *(Reproduced with permission from FM Kusumoto et al: 2018 ACC/AHA/HRS guideline on the evaluation and management of patients with bradycardia and cardiac conduction delay. Heart Rhythm 16:e128, 2019.)*

There is no established heart rate below which pacemaker treatment is indicated (**Table 244-2**). Well-conditioned athletes can have resting sinus rates well below 40 beats/min, and some individuals can have similar levels of bradycardia during sleep. Permanent pacing is typically not indicated for sleep-related pauses felt secondary to high vagal tone in the absence of other symptoms. Asymptomatic sinus bradycardia has not been associated with adverse outcomes and does not typically warrant permanent pacing. In situations such as asymptomatic sinus bradycardia, sinus pauses secondary to physiologically elevated parasympathetic tone, transient pauses during sleep, or asymptomatic SND where symptoms have been documented to occur in the absence of bradycardia, a pacemaker is generally not indicated.

TABLE 244-2 Indications for Permanent Pacing in Sinus Node Dysfunction (SND)

- Symptoms that are directly attributable to SND
- Symptomatic sinus bradycardia because of essential medication therapy for which there is no alternative treatment
- Tachy-brady syndrome and symptoms attributable to bradycardia
- Symptomatic chronotropic incompetence
- In patients with symptoms that are possibly attributable to SND, a trial of oral theophylline may be considered to increase heart rate and determine if permanent pacing may be beneficial

Source: FM Kusumoto et al: Heart Rhythm 16:e128, 2019.