Exercise Prescription for Osteoarthritis

Indexing Metadata/Description

› Procedure: Exercise Prescription for Osteoarthritis
› Synonyms: Osteoarthritis, exercise prescription; exercise program guidelines, osteoarthritis; guidelines for exercise, osteoarthritis
› Area(s) of specialty: Orthopedic Rehabilitation, Cardiovascular Rehabilitation, Home Health, Women's Health, Geriatric Rehabilitation

› Description/use:
  • Individualized exercise therapy is a mainstay of conservative treatment for osteoarthritis (OA). Exercise is widely promoted by the Arthritis Foundation and prescribed by healthcare professionals to reduce joint pain and improve physical functioning in persons with OA(1,2,3)
  • Medical guidelines and practical advice provide the basis for prescription of safe and effective therapeutic exercise training for patients with OA(4,5,6)
  • Persons living with OA welcome community-based exercise programs and education for self-management of their OA(1,2)
  • This Clinical Review focuses on general exercise prescription for patients with OA. For comprehensive treatment strategies, see the Clinical Review that deals with a specific site of OA (e.g., knee, hip, spine, hand)

› Indications: Joint pain, mobility impairments, functional limitations in daily life, physical inactivity, overweight/obesity

› CPT code:
  • 97110 (therapeutic exercises to develop strength and endurance, range of motion, and flexibility)
  • 97530 (use of dynamic activities to improve functional performance)
  • 97535 (self-care/home management training)

› G-codes:
  • Mobility G-code Set:
    –G8978, Mobility: walking & moving around functional limitation, current status, at therapy episode outset and at reporting intervals
    –G8979, Mobility: walking & moving around functional limitation; projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    –G8980, Mobility: walking & moving around functional limitation, discharge status, at discharge from therapy or to end reporting
  • Carrying, Moving & Handling Objects G-code Set:
    –G8984, Carrying, moving & handling objects functional limitation, current status, at therapy episode outset and at reporting intervals
    –G8985, Carrying, moving & handling objects functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
    –G8986, Carrying, moving & handling objects functional limitation, discharge status, at discharge from therapy or to end reporting
• **Other PT/OT Primary G-code Set:**
  – G8990, Other physical or occupational therapy primary functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8991, Other physical or occupational therapy primary functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8992, Other physical or occupational therapy primary functional limitation, discharge status, at discharge from therapy or to end reporting

• **Other PT/OT Subsequent G-code Set:**
  – G8993, Other physical or occupational therapy subsequent functional limitation, current status, at therapy episode outset and at reporting intervals
  – G8994, Other physical or occupational therapy subsequent functional limitation, projected goal status, at therapy episode outset, at reporting intervals, and at discharge or to end reporting
  – G8995, Other physical or occupational therapy subsequent functional limitation, discharge status, at discharge from therapy or to end reporting

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Source: [https://www.cms.gov/](https://www.cms.gov/)

› **Reimbursement:** Reimbursement for therapy will depend on insurance contract coverage; no specific issues or information regarding reimbursement has been identified for exercise prescription

**Indications for Exercise Prescription for Osteoarthritis**

› OA is an inflammatory, erosive disease that damages the articular cartilage, synovial lining, bones, and ligaments mainly in the knee, hip, spine, finger, and great toe joints. The national annual estimate of adults in the United States with probable OA during 2008–2011 was 30.8 million, or 13.4% of the population[^5]

› Authors of a population-based study (N = 1.76 million persons) in Spain found that overweight or obese individuals had significantly increased risk of OA in the knee, hip, and hand joints compared to the normal-weight cohorts. BMI had a direct positive correlation with knee OA risk[^8]

› Knee OA is strongly associated with pain-related functional limitations in daily life and reduced quality of life[^10]

› Overweight and obesity increase risk for knee replacement surgery, while weight-reduction strategies could potentially reduce the need for knee replacement surgery by 31%[^11]

› Authors of a 2015 Cochrane review found high-quality evidence that exercise reduces pain and moderate-quality evidence that exercise improves physical function among persons with knee OA[^12]

› For physically inactive persons with OA, exercise training can also prevent and reduce excess body fat accumulation that leads to high BMI, which may contribute to joint damage[^13]
OA is a debilitating condition that can affect over 20% of the population over 50 years of age. Annually, approximately 15% of this population will consult with their physician regarding knee pain. Physicians should encourage their OA patients to participate in exercise programs to improve their OA condition and overall health\(^{(27,28)}\).

**Guidelines for Exercise Prescription for Osteoarthritis**

- General recommendations for frequency, intensity, time, and type (FITT) of exercise training\(^{(4,5,6,13)}\):
  - Frequency: 3 to 4 times per week
  - Intensity: individually prescribed zones for target heart rate (HR) and the Borg rating of perceived exertion (RPE), and/or the “talk test.” Increasing the intensity of training above appropriate zones may not increase the benefits of exercise\(^{(14)}\)
  - Time in target intensity zone: usually beginning with 10 to 15 minutes, progressing to 30–45 minutes as tolerated
  - Type of physical activity: exercise that uses large muscles for aerobic activity (e.g., walking, swimming, cycling) or for resistance exercise such as weight-lifting\(^{(5,15)}\)
    - Authors of a study conducted in the United States concluded that swimming was as effective as land-based cycling in reducing joint pain and stiffness and improving muscle strength and functional capacity in middle-aged and older adults with OA\(^{(18)}\)
      - Both land-based cycling group and swimming group exercised 45 min./day, 3 days/week at 60–70% heart rate reserve for 12 weeks

**Contraindications/Precautions to Exercise**

- Obtain physician referral and written informed consent for exercise therapy from patient or legal caretaker. Older patients with OA commonly have coexisting disorders that may reduce exercise tolerance and require using a tailored comorbidity-adapted exercise protocol.
- OA in the lower extremities is associated with impaired balance and a high risk of falls. Closely monitor patients with a history of falls or at risk for falls
- Individual screening and assessment for exercise prescription are necessary because of the heterogeneity of physical activity tolerance among patients with OA
- Modify exercises to comply with weight-bearing restrictions
- Ensure close supervision with instruction in the beginning stage of exercise training or until the patient is able to consistently demonstrate safe independence
- Avoid performing exercises that increase pain, swelling, or inflammation

**Examination**

- **Contraindications/precautions to examination**
  - Evaluation of functional capacity and ambulatory limitations provides a basis for tailoring the exercise prescription
  - Scan all joints (knees, shoulders, wrist, and hands) for generalized OA involvement
  - Postpone exam if patient exhibits symptoms of acute flare-up with atypical severe joint pain or decreased mobility
- **History**
  - **History of present illness/injury for which the procedure is needed**
    - **Mechanism of injury or etiology of illness**: What is the primary cause of the patient’s OA? If trauma-related, when did the injury occur and what was the treatment? What is the time course of current presenting symptoms, and are they getting better, worse, or staying the same? Does the history indicate gradually worsening function during daily activities (e.g., walking, squatting, kneeling, and stepping down)?
    - **Course of treatment**
      - **Medical management**: Document prior conservative treatments (e.g., exercise therapy, medications/injections, ambulatory aid, bracing, weight loss, diet) that have been tried and evaluate their effectiveness for pain reduction and physical functioning. What is patient’s current weight-bearing status? Which joints are arthritic?
      - **Surgical management**: Document any surgical interventions for OA. What were the outcomes for pain reduction and physical functioning?
      - **Medications for current illness/injury**: NSAIDs, oral narcotics, and corticosteroid injections are often trialed for pain management. Hylan injections may be trialed. Document the prescribed medications being taken. Are they effectively controlling patient’s symptoms?
- **Diagnostic tests completed:** Imaging studies may include X-rays, MRI, and bone scans. Laboratory tests may have been conducted for comorbidities and/or to rule out infection or systemic process (e.g., rheumatoid arthritis [RA])

- **Home remedies/alternative therapies:** Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether they help or not. Has the patient tried topical remedies or acupuncture for pain management, and were they effective? Any use of dietary supplements?

- **Previous therapy:** Document whether patient has had prior occupational or physical therapy for this or other conditions and what specific treatments were helpful or not helpful

- **Aggravating/easing factors:** Do certain activities, positions, or environmental conditions aggravate symptoms? Does the patient consider exercise helpful for improving mobility or reducing pain? Is the pain worse after a weight-bearing activity and better with rest? Does activity-related increased joint stiffness (“gelling” sign) occur after a rest period?

- **Body chart:** Use body chart to document location and nature of symptoms. Use visual analog scale (VAS) to measure joint pain level. Tenderness is common over the involved joint(s)

- **Nature of symptoms:** Document nature of symptoms (constant vs intermittent, sharp, dull, aching, burning, numbness, tingling)
  - Joint pain
  - Soft-tissue tenderness
  - Inflammation/swelling
  - Weakness of the affected muscles
  - Limited ROM
  - Reduced function (posture, mobility)
  - Decreased tolerance in ADLs

- **Rating of symptoms:** Use a VAS or 0–10 scale to assess symptoms at their best, worst, and at the moment (specifically address if pain is present now and how much)

- **Pattern of symptoms:** Document changes in symptoms throughout the day and night, if any (a.m., mid-day, p.m., night) and if symptoms change due to weather or other external variables. Do changes in posture exacerbate the problem?

- **Sleep disturbance:** Do the symptoms disturb sleep and/or require a preferred sleeping position? Does the patient use pillows for positioning or support?

- **Other symptoms:** Document coexisting conditions or other symptoms that may complicate exercise, such as muscle atrophy, poor balance, or history of falls. Document any symptoms that may indicate need for referral to physician, such as cognitive or neurological deficits, dizziness, bowel/bladder/sexual dysfunction, saddle anesthesia

- **Respiratory status:** Is there a history of respiratory compromise? Does the patient require supplemental oxygen?

- **Barriers to learning:** Is communication with the patient limited by language, hearing, vision, or cognitive impairment?

  - Are there any other barriers to learning? Yes/No
  - If Yes, describe

- **Medical history**

  - **Past medical history**

  - **Previous history of same/similar diagnosis**

  - **Comorbid diagnoses:** Are there coexisting movement problems such as multiple sclerosis, stroke, muscular dystrophy, or Parkinson’s disease? Is there a history of obesity, diabetes, cancer, cardiovascular disease, hypertension, or pulmonary disease? Does the patient have osteoporosis or spinal stenosis?

  - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including OTC drugs)

  - **Other symptoms:** Ask patient about other symptoms he/she may be experiencing

- **Social/occupational history:**

  - **Patient's goals:** Document whether the patient has specific goals for exercise therapy (e.g., increased ability for certain activities, weight loss)

  - **Vocation/avocation and associated repetitive behaviors, if any:** What is the patient’s occupation and desired recreational activities? Does the patient participate in any sports? Is OA interfering with desire to be active or work?

  - **Functional limitations/assistance with ADLs/adaptive equipment:** Do symptoms interfere with ADLs? Does the patient report limitations in use of home facilities such as toilet or bathtub? Are there any other concerns regarding functional mobility (e.g., use of upper extremities)?

  - **Living environment:** Are there barriers in the home that impede access, such as stairs? Are physical modifications needed to improve accessibility?
Relevant tests and measures (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)

- **Anthropometric characteristics**: Determine height, weight, and BMI
- **Assistive and adaptive devices**: Assess the need for and proper use of ambulatory assistive devices. Would the patient benefit from adaptive or assistive devices for ADLs?
- **Balance**: Assess both static and dynamic standing balance, as well as unilateral balance of the contralateral extremity (especially if the patient is toe-touch or partial weight-bearing [PWB]). If full weight-bearing (FWB), assess balance in standing on each leg, walking on toes, and timed single-legstand. If the patient cannot stand on one leg, assess with eyes open and eyes closed (Romberg test). Observe for deficits in hip strategies in an effort to maintain balance. Use Berg Balance Scale (BBS), as indicated
- **Cardiorespiratory function and endurance**: Assess resting HR and blood pressure (BP). The 6-minute walk for distance test (6MWT) may be used to assess aerobic endurance. Check HR and for shortness of breath and RPE during 6MWT or other activity
- **Functional mobility** (including transfers, etc.): Assess ability in sit-to-stand, turning, stooping, kneeling, squatting, and sitting down. Functional mobility can be assessed by marching-on-the-spot, ability to use stairs, and Timed Up and Go (TUG) test
- **Gait/locomotion**: Assess walking ability, including gait speed, tandem gait, and turns. Note ability to change directions while walking and any asymmetry or abnormality that may be contributing to symptoms. Assess gait safety with the Dynamic Gait Index (DGI), as indicated
- **Joint integrity and mobility**: Assess mobility of the involved joint(s)
- **Muscle strength**: Scan functional strength of the lower and upper extremities using manual muscle testing (MMT). Compare to unaffected side. Expect asymmetry in extremity strength due to compensation for pain and disuse atrophy in the affected limb
- **Observation/inspection/palpation** (including skin assessment): Assess for
  - Deformities
  - Edema
  - Tender points
- **Pain**: Assess with VAS
- **Posture**: Assess general posture, lower extremity alignment, and leg length for asymmetries and/or abnormalities that may be contributing to symptoms
- **Range of motion**: Scan functional ROM and flexibility of the upper and lower extremities. Compare to unaffected side. Expect general stiffness/muscle tightness, reduced flexibility, and contracture in advanced cases
- **Reflex testing**: Assess deep-tendon reflexes
- **Self-care/activities of daily living**: Assess patient’s ability in self-care and ADLs, as indicated
- **Sensory testing**: Assess sensation to light touch
- **Special tests specific to diagnosis**:
  - Graded exercise test (GXT): Protocols are available for administering a treadmill or cycle ergometer test based on HR, BP, and RPE responses, as well as any symptoms, to evaluate functional aerobic capacity. The target aerobic exercise training intensity zone is then guided by the observed responses. To ensure safety and effectiveness, a physician, clinical exercise physiologist, or physical therapist should supervise the exercise test and write the exercise prescription
  - Activity limitations can be assessed with the Western Ontario and McMaster University Index (WOMAC) physical functioning and pain domains

**Assessment/Plan of Care**

- **Contraindications/precautions**
  - Patients with a diagnosis of OA may be at risk for falls during physical activity; follow facility protocols for fall prevention and post fall-prevention instructions at bedside, if inpatient. Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall-prevention strategies. Discharge criteria should include independence with fall-prevention strategies
  - Avoid strenuous exercises when patient exhibits symptoms of acute flare-up. Use the “light” RPE for guiding the intensity of warm-up and startup exercise, especially for physically inactive patients
• Patients with significant pain and functional limitation may require interim goals and should be encouraged to exercise as they are able(5).

• Educate patient that small amounts of discomfort in joints after exercise is common but patient should let practitioner know if higher pain ratings are still present 2 hours after exercising, as frequency and/or intensity may need to be reduced(5).

• Make sure that patient has good shoes for shock absorption and stability(5).

• Clinicians should follow the exercise guidelines of their clinic/hospital and what is ordered by the patient’s physician.

• Electrotherapeutic modalities are usually not indicated for exercise training. However, the referring physician may prescribe treatment for pain or coexisting musculoskeletal conditions.

–Rehabilitation professionals should always use their professional judgment regarding the use of modalities.

Diagnosis/need for procedure: OA/reduced physical fitness (aerobic capacity and endurance); decreased muscle strength; deficits in posture, balance, and gait; post-op treatment; functional decline in ADLs; increased risk for falls.

Prognosis:
• OA cannot be cured, but exercise training might improve the patient’s physical functioning, decrease pain, and prevent other chronic health conditions(12,26).

• The natural history of OA is variable and thus prognosis is unpredictable. Prognosis for improved physical functioning will depend on the patient’s OA and coexisting conditions(13).

• Authors of a Cochrane systematic review in 2017 assessed the benefits and harms of exercise when compared to other interventions in subjects with hand OA. Pooled results from 5 studies showed low to moderate beneficial effects for exercise on hand function, pain, and finger joint stiffness(23).

• In a 2018 Cochrane systematic review, authors determined that exercise was beneficial for the OA population(27,28).

–Moderate-quality evidence showed absolute pain reduction of 6% for participants encouraged to exercise. Exercise improved physical function by 5.6%, self-efficacy of 1.7%, reduced depression by 2.4%, and improved QOL by 7.9%. There was no difference in anxiety levels for participants encouraged to exercise.

Referral to other disciplines:
• Occupational therapist for difficulties with ADLs, podiatrist for orthopedic footwear, orthotist for shoe inserts and bracing, acupuncturist or other alternative pain management practitioner for unremitting pain, aquatic therapist for pool exercise, personal trainer for supervised fitness program in home/gym/pool setting, dietitian for assessment of contributing nutritional factors and weight loss, surgeon if progression of symptoms indicates surgical candidacy.

Other considerations:
• Exercise therapy may be more cost-effective than “general practitioner (GP) care“(19) for the treatment of OA.

–Based on a cost-utility analysis conducted in the Netherlands with 120 GPs and 203 patients with hip OA.

–Both annual direct medical costs and average annual societal costs per patient were lower in exercise therapy group.

–However, when the outcomes were assessed in this RCT, the exercise group demonstrated better outcomes on the pain and function scores of the Hip Disability and Osteoarthritis Outcome Score (HOOS) at 3 months follow-up but not at 12 months follow-up(20).

• Patients can benefit from a preventive exercise program to forestall the potential negative effects of age-related weight gain, cardiovascular disease, type 2 diabetes, dementia, and reduced functional capacity (strength, endurance, flexibility)(4,9,13,26).

• Anti-gravity treadmill walking exercise may be useful in terms of cardiopulmonary function for patients with lower-limb OA(25).

–In research in Japan, 20 subjects with lower-limb OA walked 8 minutes on a natural surface, then on an AlterG treadmill for 8 minutes at their fastest speed at a gravity load at which lower limb pain was alleviated. A cardiopulmonary exercise load monitoring system was utilized.

–Pain after walking on level ground was significantly greater than after walking on the AlterG treadmill.

• For detailed information on reducing fall risk, see Clinical review…Falls in Older Adults, Topic ID Number: T708451.

Treatment summary:
• Research studies comparing benefits of different exercise programs for patients with OA are lacking. Controlled aerobic exercise should likely be prescribed first to develop endurance capacity and cardiopulmonary function, followed by a program of combined aerobic and strength training.
• **Patient orientation:** The initial 2 weeks of supervised training should be used to familiarize the patient to the exercise mode(s) at “light” RPE or easy intensity. The initial exercise sessions can be relatively short in duration (20 minutes), with intervals to allow for recovery periods as needed.

• **Warm-up:** A warm-up period of at least 10 minutes of “light” exercise, which may include light calisthenics and stretching, should precede exercise at the target training intensity.

• **Exercise prescription for aerobic training can be based on the FITT model as outlined above**[4-5,6,12-26]

  – Frequency: The target frequency of training is 3 or 4 days per week, preferably on alternate days
  – Intensity:

  - The target exercise intensity zone is usually based on the HR and RPE responses found during the GXT, as influenced by the patient’s age, current health status, and physical fitness.[5] In many cases, however, ambulatory patients may safely begin a moderate walking program without preliminary exercise testing using only the “talk test,” which correlates well with ventilatory threshold during GXT.[16]

  - Avoid exercise-related symptoms such as muscle pain or dyspnea that may limit exercise tolerance. For most patients, a moderate-intensity upper limit (in the absence of symptoms) can be 60% to 70% of peak HR on maximal GXT. This intensity is commonly perceived as “fairly light” to “somewhat hard” (11 to 13 on RPE scale of 6 to 20)
  – Time or duration: Time in target aerobic intensity zone usually begins with 10–15 minutes and progresses as tolerated to 30–45 minutes
  – Type of exercise: The usual modes of supervised aerobic training are stationary leg cycling, arm ergometry, and walking on a treadmill (ambulatory patients with questionable gait safety assessed by DGI may require standby assistance when walking for exercise). The home exercise program for overweight individuals should include easy walking between days of prescribed exercise to promote energy expenditure
    - Swimming has been shown to have similar benefits to a land-based program[18]

• Authors of an 2015 Cochrane review (N = 656 participants with knee or hip OA) found that higher-intensity exercise training (i.e., increased overall training time [frequency, duration, number of sessions] or the amount of work [strength, number of repetitions] or effort [HR, RPE]) provided little clinical benefit for improving pain and physical function compared to relatively lower-intensity exercise programs[14]

• Authors of a 2015 meta-analysis (N = 1,705 participants) found that resistance exercise significantly reduced knee pain and stiffness and improved physical function compared to controls who received either no intervention or only educational advice[15]

• Explosive-type progressive resistance training (RT) prior to total hip arthroplasty (THA) resulted in increased leg muscle power and significant improvement in self-reported outcomes[21]

  – Based on an RCT conducted in Denmark involving 80 patients with hip OA who were scheduled for a THA
  – The intervention was supervised preoperative progressive explosive-type RT twice a week for 10 weeks consisting of four exercises for the hip and thigh performed in three sets each (8–12 repetition maximum). The control group received regular care as usual
  – Outcome measures were HOOS and leg extension muscle power (watts), as measured by the Nottingham power rig (Nottingham University, Nottingham, UK) and adjusted for bodyweight(watts/kg)

  – Authors also reported excellent adherence to RT program and acceptable exercise-related pain

• After an 8-week strength training study, patients with knee OA had improved proprioception of passive knee flexion[24]

  – Based on research in 2018 in China involving 40 participants with knee OA
  – The strength exercise group performed squat training 3 times per week for 8 weeks and the control group received an education program

  – There were no significant differences in passive motion sense in knee extension and ankle motion between the control group and squat exercise group

• The optimal FITT prescription should include strength training to improve joint stability. Components of the exercise prescription, such as the amount and magnitude of work, program setting and duration, and supervision needed, will vary from patient to patient, depending in large part on location and severity of his or her OA and coexisting conditions[17]

  › See Description and Indications of device/equipment and Guidelines for use of device/equipment above
Reduced physical activity due to impaired aerobic capacity and strength

| Functional decline; increased fall risk (as indicated) | Maximize functional mobility and ability to perform ADLs | **Functional training**  
Posture, balance, functional mobility, and gait training, as indicated  
Explosive-type progressive RT prior to THA(21) | Progress the difficulty of functional activities/tasks to achieve desired outcomes  
Provide the patient with simple written instructions for safe, independent functional mobility exercises |
| Pain limiting functional mobility and ADLs | Reduced pain | **Therapeutic Exercise:**  
See Treatment summary above | N/A  
N/A |
| Reduced ROM, flexibility; joint hypomobility | Improved ROM, flexibility, and joint mobility | **Therapeutic Exercise:**  
See Treatment summary above | N/A  
N/A |
| Overweight, obesity | Weight loss | **Education**  
Encourage compliance with weight loss strategies | N/A |

**Desired Outcomes/Outcome Measures**

› Improved aerobic exercise capacity  
  • GXT, 6MWT  
  • Improved physical functioning with reduced pain  
  • Assessment of ADLs, WOMAC, VAS  
  • Increased strength, functional mobility, and ability to perform ADLs  
  • MMT, FIM, TUG test, DGI, reassessment, balance testing  
› Increased flexibility/ROM  
  • Goniometry  
› Reduced BMI, as indicated  
  • Body weight and height

**Maintenance or Prevention**

› Maintain compliance to prescribed exercise program  
› Maintain the highest achievable level of physical fitness and functional mobility
Weight reduction program and maintenance program, as indicated
Personalized prevention of OA is thought to be possible.
• Not all patients with knee OA progress to severe pain or joint replacement
• A major risk factor for OA is obesity. Weight loss is effective at reducing the risk of OA
• Knee pain is associated with impaired muscle function commonly seen after knee injury, and is an independent risk factor for development of knee OA. Impaired muscle function is also seen in physically inactive individuals
• Knee braces and exercise may be able to alter contact stress and cartilage matrix content, suggesting they may be ways to prevent or delay OA

Patient Education
JOSPT Perspectives for Patients, Exercise is essential for osteoarthritis: the many benefits of physical activity, https://www.arthritis.org/living-with-arthritis/exercise/

Coding Matrix
References are rated using the following codes, listed in order of strength:

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References


