

**JOINT EXAMINATION****TABLE OF CONTENTS**

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## JOINT EXAMINATION

### 1. Background and rationale

Knees will be examined for key clinical findings which have been validated for use in defining osteoarthritis (OA). A trained examiner will perform a physical examination of the knee for crepitus.

Crepitus in the knee is a fairly reproducible sign that is useful in discriminating symptomatic OA from other forms of chronic arthritis and has been incorporated into the ACR clinical criteria for knee OA.

As part of the knee examination, we will administer standard questions about knee symptoms. These questions are based on the ones asked at the baseline Health ABC examination. Those who report frequent, or activity-specific, knee symptoms will be scheduled for an x-ray examination.

### 2. Equipment and supplies

None

### 3. Safety and exclusions

There are no safety issues for this exam. Some participants may feel discomfort or pain during the knee examination. If the participant experiences pain, ask if it is OK to continue with the exam. Even if pain is felt you will not injure the participant by performing the exam.

Other exclusion:

- Do not examine for crepitus on knees with total knee replacement.

### 4. Participant preparation

The knee examination should be performed on the bare knee. The participant should be wearing garments or slacks and undergarments that can be rolled up past the knee. If the examiner cannot access the bare knee, then pants and undergarments which cannot be rolled up past the knee should be removed and the participant asked to wear hospital pants. Shoes, stockings, and pantyhose should be removed, but socks may be kept on.

## 5. Detailed examination and measurement procedures

With the participant sitting on the edge of an examination table, ask questions to assess knee symptoms, then examine the knees.

The examinations will be performed on both sides.

### A. Knee symptoms assessment

Questions will be asked of participants regarding knee pain and stiffness. The participants' answers will be used to determine whether or not they are eligible to receive an x-ray evaluation, and as study data on knee symptoms. X-ray exams will be bilateral whether or not the symptoms are bilateral.

#### 1. Ask the general arthritis question:

Q1. In the past 12 months, has a doctor told you that you have osteoarthritis or degenerative arthritis? We are specifically interested in learning about osteoarthritis or degenerative arthritis that was diagnosed for the first time in the past 12 months.

If the participant answers "No," "Don't know" or refuses, go to the Question #2.

If the participant answers "Yes," ask:

Q1a. Did the doctor say it was . . .

- i. Osteoarthritis or degenerative arthritis in your knee?
- ii. Osteoarthritis or degenerative arthritis in your hip?

Q1b. Do you take any medicines for arthritis or joint pain?

#### 2. Introduce the knee exam:

Now I am going to ask you some questions regarding any pain or stiffness in your joints. I will also examine your knees.

These questions are about pain, aching or stiffness in or around your knee. This includes the front, back, and sides of the knee.

First I'll ask about your left knee.

3. Ask knee pain questions. Do not include symptoms that are only felt in the thigh, calf or parts of the leg away from the knee.

Q2. In the past 12 months, have you had any pain, aching, or stiffness in your left knee?

If the participant answers "No," "Don't know" or refuses, go to the Question #3.

If the participant answers "Yes," ask:

Q2a. In the past 12 months, have you had pain, aching, or stiffness in your left knee on most days for at least one month?

"On most days for at least one month" should be defined as  $\geq 15$  days of any 30-day period. The days with symptoms need not be consecutive. Symptoms may vary in intensity from day to day.

If the participant answers "Yes," the participant may be eligible for a knee x-ray (see Question #10). Ask:

Q3. Now, please think about the past 30 days. In the past 30 days, have you had any pain, aching or stiffness in the left knee?

If the participant answers "No or Don't Know" or refuses, go to Question #4 for the right knee.

- a. If the participant answers, "Yes," ask Question #3a and #3b.

Q3a. In the past 30 days, have you had pain, aching, or stiffness in your left knee on most days?

If the participant answers, "Yes," the participant may be eligible for a knee x-ray (see Question #10). "On most days" should be defined as  $\geq 15$  of the last 30 days. The days with symptoms need not be consecutive. Symptoms may vary in intensity from day to day.

Q3b. In the past 30 days, how much pain have you had in your left knee for each activity I will describe. How much pain have you had while . . . ?

- a) Walking on a flat surface
- b) Going up or down stairs
- c) At night while in bed
- d) Standing upright
- e) Getting in or out of a chair (a relatively hard, supportive chair)
- f) Getting in or out of a car

Read each activity separately. Show Response Card or read the answer choices: None, Mild, Moderate, Severe, and Extreme. **If the answer for any of these activities is moderate, severe, or extreme pain, the participant may be eligible for an x-ray (see Question #10).**

If the participant does not do the activity and can't answer, check "Don't know."

3. Repeat Questions #2 and #3, this time for the right knee (Q4, 4a, Q5, 5a, 5b).
4. Ask Questions #6 and 7 regardless of knee symptoms reported above.

Q6. In the past 30 days, have you limited your activities because of pain, aching, or stiffness in your knees?

If the participant answers "Yes," ask them:

Q6a. On how many days did you limit your activities because of pain, aching, or stiffness?

Include activity limitations that last for all or part of the day, and limitations that have occurred on one day or more. Sum the days with limitations regardless of the type of activity which is limited on different days. Include long-standing, or chronic, limitation as well as those that have begun recently. Include limitations that are due in part, or in whole, to knee symptoms.

Q7. In the past 30 days, have you changed, cut back or avoided any activities in order to avoid knee pain or reduce the amount of knee pain?

This question is designed to identify people who, while saying they are not limiting their activities because of knee pain, are in fact doing things differently or avoiding certain activities in order to avoid having knee pain, or to reduce the pain.

5. Assess whether or not the participant has hip pain.

Q8. Now I am going to ask you a question about pain in your hip. In the past 12 months, have you had hip pain on most days for at least one month? This includes pain in the groin and either side of the upper thigh. Do not include pain that was only in your lower back or buttocks. (Show Card B – figure with picture of hip)

If “Yes,” ask:

Q8a. In the past 12 months, have you had this pain in the right hip, left hip, or both hips?

6. Assess whether or not the participant should be scheduled for a knee x-ray.

Q9. Is the participant eligible for a follow-up knee x-ray?

(Refer to the Data from Prior Visits Report. Our goal is to obtain follow-up knee x-rays on as many participants as possible who had a baseline x-ray at the Year 2 or 3 visit. However, for financial reasons we may not be able to include follow-up x-rays in everyone. We will take a number of factors into account in determining which participants are put on the follow-up list. The beam angle(s) that should be used for follow-up PA views on each knee will be indicated on the Data from Prior Visits Report.)

If “Yes,” explain knee OA substudy and schedule participant for a knee x-ray. Fill out a Knee X-ray Tracking Form for every participant who is eligible for a follow-up knee x-ray – whether the participant agrees to the knee x-ray or refuses. If the participant is eligible for a follow-up knee x-ray, skip Question #10 and go on to Question #11.

Q10. Did the participant have knee symptoms that met eligibility criteria for a knee x-ray in Year 2, Year 3, or Year 4?

(Refer to the Data from Prior Visits Report)

<p>If “Yes,” Q10a. Does the participant have knee symptoms at this Year 5 clinic visit? Refer to the Questions #2, 3, 4, and 5 in the Year 5 Clinic Visit Workbook. The participant must have at least one asterisked (*) answer. If “No,” STOP. Do NOT schedule</p>	<p>If “No,” Does the participant have knee symptoms at this Year 5 clinic visit?  Refer to the Questions #2, 3, 4, and 5 in the Year 5 Clinic Visit Workbook. The participant must</p>
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<p>a knee x-ray. If “Yes,”</p> <p><b>Q10b. Did the participant have a knee x-ray in Year 2, Year 3, or Year 4?</b></p> <p>Refer to the Data from Prior Visits Report. If “Yes,” do NOT schedule an x-ray. If “No,” Schedule a knee x-ray. <u>Fill out a Knee X-ray Tracking Form whether or not the participant agrees to have a knee x-ray.</u></p>	<p>have at least one asterisked (*) answer. If “No,” STOP. Do NOT schedule a knee x-ray. If “Yes,” schedule a knee x-ray. <u>Fill out a Knee X-ray Tracking Form whether or not the participant agrees to have a knee x-ray.</u></p>
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7. Assess whether or not the participant should be scheduled for a knee MRI.

**Q11. Is the participant eligible for a follow-up knee MRI?**

(Refer to the Data from Prior Visits Report. Participants are selected for follow-up MRI from among those who had a baseline MRI at the Year 2 or Year 3 visits. Not all participants who had a baseline MRI will be asked to obtain a follow-up. Some of those who get a follow-up MRI will have both knees imaged and others will have a follow-up on only one knee, based on what will give the greatest scientific yield.)

If “Yes,” explain knee OA substudy and schedule participant for a knee MRI. Fill out a Knee MRI Tracking Form for every participant who is eligible for a follow-up knee MRI – whether the participant agrees to the knee MRI or refuses.

**B. Knee exam (crepitus)**

DEFINITION: Crepitus is defined as palpable continuous noise or grinding sensation (series of small clicks, pops or grinding), similar to rough sandpaper scratching, which is felt by placing the palm of the hand over the patella as the knee is flexed and extended, or at the sides of the knee (tibiofemoral knee joints). Crepitus is caused by fissured, cracked or irregular cartilage surfaces rubbing against one another as the knee is extended and flexed. It often occurs in one knee and not the other.

**Exclusion from knee crepitus exam:**

Before you examine the right knee, ask the participant if they have had a knee replacement in their right knee. If they answer “yes,” check the “yes” response option on the Knee Crepitus Form (page 20 of the Year 5 Clinic Visit Workbook), do not do a knee exam on the right knee, and go to Question #3: “Have you had a knee replacement in your left knee?” If the participant answers “yes,” check the “yes” response option, do not examine the left knee, and go on to the next examination.

**Knee crepitus exam:**

1. Participant is seated on the edge of the exam table with hips and knees flexed to 90° and feet dangling.

“I am going to examine your knee for a sign of arthritis, which is a grinding feeling in your knee cap when you move your leg. Let me know if moving your leg causes pain in your knee.”

2. Examiner places their palm over the participant's patella with the MCP joints centered on the patella and fingers parallel to a line intersecting the lateral and medial femoral condyles. This line is known as the ‘joint line.’
3. Examiner asks participant to actively move leg to extended position (zero degrees) and then back to 90° of flexion. This is done twice, then rest a moment, then twice more. Each movement to extension should take about 2 seconds. If the participant needs help, the examiner can help move the leg to the fully extended position or until the participant complains of pain.

If the examiner is uncertain of the result, it is OK to ask the participant to repeat the movements of the knee. It may sometimes be useful to test one side, then the other, and to compare the sensation in the two knees. To confirm crepitus that is only felt in an isolated part of the joint, put your fingertips directly on the area of the abnormal sensation.

4. Positive for crepitus is defined as a series of small clicks or pops or grinding sensations during extension. Multiple, nearly continuous clicking or popping is required to define crepitus. A similar sensations should be felt on all trials.

PLEASE NOTE: Check for crepitus during active extension of the knee by palpating the patellofemoral joint with the fingers pointing parallel to the joint line when the knee is in extension. Your MCPs should rest on the patella. Crepitus is a palpable or audible crunching sensation evoked by movement. On

palpation it may vary from fine to coarse. The sensation may vary from that experienced on using very fine sandpaper to coarse sandpaper to a frank rough grinding sensation. Fine crepitation may be palpated in inflammatory arthritides such as rheumatoid arthritis, and the sensation is confined to the area around the joint. Coarse crepitus occurs in inflammatory arthritis and more frequently in degenerative joint disease, and is caused by irregularity of the cartilaginous surfaces of the joints, which may be fissured or worn away. Crepitus should be distinguished from isolated cracking sounds. These are evoked by slipping of ligaments or tendons moving over bony surfaces or, as in the example of “cracking” one’s knuckles, by the sudden release of nitrogen gas into the joint space when the joint is subjected to distractive forces creating a negative pressure within the joint.

5. Crepitus is coded as :

0 = absent on all trials	(Trial = extend knee and return to starting position.)
1 = present on just one trial	
2 = present on two or three trials	
3 = present all four trials	
4 = uncertain	
7 = unable to examine due to knee pain	
8 = unable to examine for other reason	

6. If the examiner records crepitus present on just one trial or remains uncertain after one or more attempts, the examiner should request a second certified examiner to perform the examination. A final score which represents the consensus of the two examiners is recorded.

7. Repeat with other knee.

## **6. Alert values/follow-up reporting to participants**

There are no alert values for this examination.

Participants can be told at the time of the examination the results of the examination for crepitus.

If the participant has crepitus, the examiner should explain what crepitus is: “Crepitus is defined as a palpable continuous noise or sensation (clicking, popping or grinding) similar to sandpaper scratching sensation which is felt by placing the palm of the hand over the patella as the knee is flexed and extended, or at the sides of the

knee.” Studies show that it is a common finding in people with osteoarthritis of the knee, but that it also occurs in people who do not have osteoarthritis of the knee. If the participant has both knee pain and crepitus, they may have knee OA according to the American College of Rheumatology clinical criteria. Crepitus without knee pain is of unknown significance.

Treatments for OA include medications to reduce pain and inflammation (aspirin and nonsteroidal antiinflammatory drugs) exercise, and for the knee, weight control. Provide those with any of the above findings with a copy of the NIH Age Page “Arthritis Advice” (Appendix 1)

## **7. Quality assurance**

### **7.1 Training**

Experience in musculoskeletal examinations is preferred but not required. Training includes:

- Read and study operations manual chapter
- Attend training session
- Practice on elderly volunteers (elderly participants are much more likely to have the findings) and compare findings with other examiners.
- Discuss problems with a study rheumatologist

### **7.2 Certification requirements**

- Fulfills training requirements
- Conducts exam on two elderly participants with more experienced examiner and reaches consensus on findings

### **7.3 Quality control checklist**

#### **Knee Pain Assessment**

- Correctly asks questions regarding knee pain and stiffness.
  - Reads activities separately for Q3b and Q5b.
  - Reads answer categories and/or used Card for Q3b and Q5b.
- Follows skip patterns correctly
- Accurately records participant's responses on clinic visit workbook

**Knee exam**

- Examination done on bare knee
- Participant sitting, knee able to move freely
- Palm cupped over knee
- Participant fully extends knee
  - with assistance of examiner, if needed
- Two trials, momentary rest, then two more trials
- If score is uncertain or crepitus is present on just one trial, consensus obtained with another examiner

## APPENDIX 1 NIH Arthritis Advice

# Arthritis Advice

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Half of all people age 65 and older have arthritis. There are over 100 different forms of arthritis and many different symptoms and treatments. We do not know what causes most forms of arthritis. Some forms are better understood than others.

Arthritis causes pain and loss of movement. It can affect joints in any part of the body. Arthritis is usually chronic, meaning it can occur over a long period of time. The more serious forms can cause swelling, warmth, redness, and pain. The three most common kinds of arthritis in older people are osteoarthritis, rheumatoid arthritis, and gout.

## Common Forms of Arthritis

**Osteoarthritis (OA)**, at one time called degenerative joint disease, is the most common type of arthritis in older people. Symptoms can range from stiffness and mild pain that comes and goes to severe joint pain and even disability.

OA usually affects the hands and the large weight-bearing joints of the body: the knees and hips. Early in the disease, pain occurs after activity and rest brings relief; later on, pain occurs with very little movement, even during rest.

Scientists think that several factors may cause OA in different joints. OA in the hands or hips may run in families. OA in the knees is linked with being overweight. Injuries or overuse may cause OA in joints such as knees, hips, or hands.

**Rheumatoid arthritis (RA)** can be one of the more disabling forms of arthritis. Signs of RA often include morning stiffness, swelling in three or more joints, swelling of the same joints on both sides of the body (both hands, for example), and bumps (or nodules) under the skin most commonly found near the elbow. RA can occur at any age and affects women about three times more often than men.

Scientists don't know what causes RA but think it has something to do with a breakdown in the immune system, the body's defense against disease. It is also likely that people who get RA have certain inherited traits (genes) that cause a disturbance in the immune system.

**Gout** occurs most often in older men. It affects the toes, ankles, elbows, wrists, and hands. An acute attack of gout is very painful. Swelling may cause the skin to pull tightly around the joint and make the area red or purple and very tender. Medicines can stop gout attacks, as well as prevent further attacks and damage to the joints.

## Treatments

Treatments for arthritis work to reduce pain and swelling, keep joints moving safely, and avoid further damage to joints. Treatments include medicines, special exercise, use of heat or cold, weight control, and surgery.

**Medicines** help relieve pain and reduce swelling. Acetaminophen or ACT should be the first drug used to control pain in patients with osteoarthritis (OA). Patients with OA who don't respond to ACT and patients with RA and gout are most commonly treated with nonsteroidal anti-inflammatory drugs such as ibuprofen. People taking medicine for any form of arthritis should limit the amount of alcohol they drink. (For more information, see the *Age Page* "Arthritis Medicines.")

**Exercise**, such as a daily walk or swim, helps keep joints moving, reduces pain, and strengthens muscles around the joints. Rest is also important for the joints affected by arthritis. Physical therapists can develop personal programs that balance exercise and rest.

Many people find that soaking in a warm bath, swimming in a heated pool, or applying **heat or cold** to the area around the joint helps reduce pain. **Controlling or losing weight** can reduce the stress on joints and can help avoid further damage.

When damage to the joints becomes disabling or when other treatments fail to reduce pain, your doctor may suggest **surgery**. Surgeons can repair or replace damaged joints with artificial ones. The most common operations are hip and knee replacements.

## Unproven Remedies

Arthritis symptoms may go away by themselves but then come back weeks, months, or years later. This may be why many people with arthritis try quack cures or remedies that have not been proven instead of getting medical help. Some of these remedies, such as snake venom, are harmful. Others, such as copper bracelets, are harmless but also useless. The safety of many quack cures is unknown.

Here are some tipoffs that a remedy may be unproven: claims that a treatment like a lotion or cream works for all types of arthritis and other diseases too; scientific support comes from only one research study; or the label has no directions for use or warnings about side effects.

## Common Warning Signs of Arthritis

- Swelling in one or more joint(s)
- Morning stiffness lasting 30 minutes or longer
- Joint pain or tenderness that is constant or that comes and goes
- Not being able to move a joint in the normal way

- Redness or warmth in a joint
- Weight loss, fever, or weakness and joint pain that can't be explained

If any one of these symptoms lasts longer than 2 weeks, see your regular doctor or a doctor who specializes in arthritis (a rheumatologist). The doctor will ask questions about the history of your symptoms and do a physical exam. The doctor may take x-rays or do lab tests before developing a treatment plan.

### Resources

For more information on arthritis contact:

National Institute of Arthritis and Musculoskeletal and Skin Diseases

Building 31, Room 4C05

Bethesda, MD 20892

(301) 496-8188

The Arthritis Foundation

P.O. Box 19000

Atlanta, GA 30325

(800) 283-7800

For a list of free publications from the National Institute on Aging (NIA), contact the NIA Information Center, P.O. Box 8057, Gaithersburg, MD 20898-8057; 1-800-222-2225; (1-800-222-4225 TTY); e-mail:niainfo@access.digex.net

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*National Institute on Aging*

**APPENDIX 2 Report of Knee x-ray Findings to Participants**



HABC Enrollment ID #					Date of reading:				
H						/		/	
					Month	Day	Year		

**KNEE RADIOGRAPH PARTICIPANT REPORT**

Participant name: \_\_\_\_\_

This report describes what the HEALTH ABC arthritis specialist (rheumatologist) found when they looked at your knee x-rays. If you have any questions about this report, please contact your doctor. This exam was conducted for research purposes only, and was not performed to diagnose any medical conditions.

The examiners were looking for the following:

- Osteoarthritis** develops when the cartilage in the joints starts to wear away. This is usually accompanied by changes in the bone near the joint which can be seen on an x-ray. It is the most common form of arthritis.
- Osteophytes** are bony growths which form around a joint affected by osteoarthritis.
- Joint space** narrowing is a decrease in the space between the joints which occurs when the cartilage wears away.
- Cysts** are fluid-filled sacs in the bone near joints affected by osteoarthritis.

**1 OSTEOARTHRITIS**

A. Tibiofemoral joint	LEFT KNEE	RIGHT KNEE
Normal	<input type="checkbox"/>	<input type="checkbox"/>
Mild (definite osteophytes)	<input type="checkbox"/>	<input type="checkbox"/>
Moderate (osteophytes, definite loss of joint space, possible sclerosis and cysts)	<input type="checkbox"/>	<input type="checkbox"/>
Severe (large osteophytes, moderate to severe loss of joint space, definite sclerosis, cysts, or subluxation)	<input type="checkbox"/>	<input type="checkbox"/>

  

B. Patellofemoral joint	LEFT KNEE	RIGHT KNEE
Normal	<input type="checkbox"/>	<input type="checkbox"/>
Mild (definite osteophytes)	<input type="checkbox"/>	<input type="checkbox"/>
Moderate (osteophytes, definite loss of joint space)	<input type="checkbox"/>	<input type="checkbox"/>
Severe (large osteophytes, moderate to severe loss of joint space, subluxation)	<input type="checkbox"/>	<input type="checkbox"/>

**2 OTHER FINDINGS**

Chondrocalcinosis	<input type="checkbox"/>	<input type="checkbox"/>
Paget's disease	<input type="checkbox"/>	<input type="checkbox"/>
Loose bodies (osteochondromatosis)	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>
_____		
_____		

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