

# **BASELINE<sup>®</sup>** **EVALUATION** **INSTRUMENTS**

## **3-PIECE HAND EVALUATION SET**



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### 3-piece hand evaluation set

**Hydraulic hand dynamometer** – The hand dynamometer can be used to measure grip strength. It is calibrated in pounds and kilograms of force.

The grip handle is adjustable to accommodate various size hands. Always use the same grip setting and dynamometer when evaluating a specific subject for hand trauma or disease.

Set the handle to the desired position. Have subject hold the dynamometer in a comfortable position. The shoulder should be adducted and neutrally rotated, the elbow flexed to 90 degrees, and the forearm and wrist should be in a neutral position. Have the subject squeeze the handle using his/her maximum effort. The red maximum pointer will remain at the subject's maximum reading until it is reset. The red maximum pointer must be reset before each grip test. Rotate the small knurled knob on top of the dial indicator in a counterclockwise direction until it rests against the black pointer at the zero marking. Each grip test should be repeated three times and the average result should be used.

Grip strength varies depending upon the size of the object being grasped. The adjustable handle allows for quantification of grip strength for different sized objects.

To determine whether a subject is exerting maximum effort use the following protocol:

- Take readings with adjustable handle in all five positions
- Test the normal hand and then the injured hand
- Repeat the test after five minutes

If maximum effort was exerted there should be approximately a 10% variation in the two sets of test results.

**Hydraulic Pinch Gauge** – The finger pinch gauge can be used to measure pinch strength. It is calibrated in pounds and kilograms of force.

Apply pinch force at the pinch groove while holding the pinch gauge between your thumb and finger(s). When force is applied further toward the tip the reading will be slightly higher. When force is applied further toward the rear the reading will be slightly lower.

The gauge must be "zeroed" before each pinch test. Grasp the knurled ring of the dial indicator and rotate it until the zero on the dial indicator is directly under the black pointer.

The red maximum pointer must be reset before each pinch test. Rotate the small knurled knob on top of the dial indicator in a counterclockwise direction until it rests against the black pointer at the zero marking. The red maximum pointer will remain at the subject's maximum reading until it is reset.

Use the pinch gauge to perform the three basic pinch tests:

- Tip Pinch --- thumb tip to index fingertip
- Key Pinch --- thumb pad to lateral aspect of middle phalanx of index finger
- Palmer Pinch --- thumb pad to pads of the index and middle fingers

| NORMS FOR ADULT GRIP STRENGTH performance of all subjects (lbs)                     |              |                   |          |                     |          | NORMS FOR ADULT PINCH STRENGTH Key Pinch strength performance of all subjects (lbs)    |        |                   |          |                     |          |       |      |       |       |
|-------------------------------------------------------------------------------------|--------------|-------------------|----------|---------------------|----------|----------------------------------------------------------------------------------------|--------|-------------------|----------|---------------------|----------|-------|------|-------|-------|
| age                                                                                 | hand         | men<br>mean<br>SD | low-high | women<br>mean<br>SD | low-high | age                                                                                    | hand   | men<br>mean<br>SD | low-high | women<br>mean<br>SD | low-high |       |      |       |       |
| 20-24                                                                               | dominant     | 121.0             | 20.6     | 91-167              | 70.4     | 14.5                                                                                   | 46-95  | 20-24             | dominant | 26.0                | 3.5      | 21-34 | 17.6 | 2.0   | 14-23 |
|                                                                                     | non-dominant | 104.5             | 21.8     | 71-150              | 61.0     | 13.1                                                                                   | 33-88  | non-dominant      | 24.8     | 3.4                 | 19-31    | 16.2  | 2.1  | 13-23 |       |
| 25-29                                                                               | dominant     | 120.8             | 23.0     | 78-158              | 74.5     | 13.9                                                                                   | 48-97  | 25-29             | dominant | 26.7                | 4.9      | 19-41 | 17.7 | 2.1   | 14-22 |
|                                                                                     | non-dominant | 110.5             | 16.2     | 77-139              | 63.5     | 12.2                                                                                   | 49-97  | non-dominant      | 25.0     | 4.7                 | 19-39    | 16.6  | 2.1  | 13-22 |       |
| 30-34                                                                               | dominant     | 121.8             | 22.4     | 70-170              | 78.7     | 19.2                                                                                   | 46-137 | 30-34             | dominant | 26.4                | 4.8      | 20-36 | 18.7 | 3.0   | 13-25 |
|                                                                                     | non-dominant | 110.4             | 21.7     | 64-145              | 68.0     | 17.7                                                                                   | 36-115 | non-dominant      | 26.2     | 5.1                 | 17-36    | 17.8  | 3.6  | 12-26 |       |
| 35-39                                                                               | dominant     | 119.7             | 24.0     | 76-176              | 74.1     | 10.8                                                                                   | 50-99  | 35-39             | dominant | 26.1                | 3.2      | 21-32 | 16.6 | 2.0   | 12-21 |
|                                                                                     | non-dominant | 112.9             | 21.7     | 73-157              | 66.3     | 11.7                                                                                   | 49-91  | non-dominant      | 25.6     | 3.9                 | 18-32    | 16.0  | 2.7  | 12-22 |       |
| 40-44                                                                               | dominant     | 116.8             | 20.7     | 84-165              | 70.4     | 13.5                                                                                   | 35-103 | 40-44             | dominant | 25.6                | 2.6      | 21-31 | 16.7 | 3.1   | 10-24 |
|                                                                                     | non-dominant | 112.8             | 18.7     | 73-157              | 62.3     | 13.8                                                                                   | 35-94  | non-dominant      | 25.1     | 4.0                 | 19-31    | 15.8  | 3.1  | 8-22  |       |
| 45-49                                                                               | dominant     | 109.9             | 23.0     | 65-155              | 62.2     | 15.1                                                                                   | 39-100 | 45-49             | dominant | 25.8                | 3.9      | 19-35 | 17.6 | 3.2   | 13-24 |
|                                                                                     | non-dominant | 100.8             | 22.8     | 58-160              | 56.0     | 12.7                                                                                   | 37-83  | non-dominant      | 24.8     | 4.4                 | 18-42    | 16.6  | 2.9  | 12-24 |       |
| 50-54                                                                               | dominant     | 113.6             | 18.1     | 79-151              | 65.8     | 11.6                                                                                   | 38-87  | 50-54             | dominant | 26.7                | 4.4      | 20-34 | 16.7 | 2.5   | 12-22 |
|                                                                                     | non-dominant | 101.9             | 17.0     | 70-143              | 57.3     | 10.7                                                                                   | 35-76  | non-dominant      | 26.1     | 4.2                 | 20-37    | 16.1  | 2.7  | 12-22 |       |
| 55-59                                                                               | dominant     | 101.1             | 26.7     | 59-154              | 57.3     | 12.5                                                                                   | 33-86  | 55-59             | dominant | 24.2                | 4.2      | 19-34 | 15.7 | 2.5   | 11-21 |
|                                                                                     | non-dominant | 83.2              | 23.4     | 43-128              | 47.3     | 11.9                                                                                   | 31-76  | non-dominant      | 23.0     | 4.7                 | 13-31    | 14.7  | 2.2  | 12-19 |       |
| 60-64                                                                               | dominant     | 89.7              | 20.4     | 51-137              | 55.1     | 10.1                                                                                   | 37-77  | 60-64             | dominant | 23.2                | 5.4      | 14-37 | 15.5 | 2.7   | 10-20 |
|                                                                                     | non-dominant | 76.8              | 20.3     | 27-116              | 45.7     | 10.1                                                                                   | 29-66  | non-dominant      | 22.2     | 4.1                 | 16-33    | 14.1  | 2.5  | 10-19 |       |
| 65-69                                                                               | dominant     | 91.1              | 20.6     | 56-131              | 49.6     | 9.7                                                                                    | 35-74  | 65-69             | dominant | 23.4                | 3.9      | 17-32 | 15.0 | 2.6   | 10-21 |
|                                                                                     | non-dominant | 76.8              | 19.8     | 43-117              | 41.0     | 8.2                                                                                    | 29-63  | non-dominant      | 22.0     | 3.6                 | 17-28    | 14.3  | 2.8  | 10-20 |       |
| 70-75                                                                               | dominant     | 75.3              | 21.5     | 32-109              | 49.6     | 11.7                                                                                   | 33-78  | 70-75             | dominant | 19.3                | 2.4      | 16-25 | 14.5 | 2.9   | 8-22  |
|                                                                                     | non-dominant | 64.8              | 18.1     | 32-93               | 41.5     | 10.2                                                                                   | 23-67  | non-dominant      | 19.2     | 3.0                 | 13-28    | 13.8  | 3.0  | 9-22  |       |
| 75+                                                                                 | dominant     | 65.7              | 21.1     | 40-135              | 42.6     | 11.0                                                                                   | 25-65  | 75+               | dominant | 20.5                | 4.6      | 9-31  | 12.6 | 2.3   | 8-17  |
|                                                                                     | non-dominant | 55.0              | 17.0     | 31-119              | 37.6     | 8.9                                                                                    | 24-61  | non-dominant      | 19.1     | 3.0                 | 13-24    | 11.4  | 2.6  | 7-16  |       |
| ALL                                                                                 | dominant     | 104.3             | 28.3     | 32-176              | 62.8     | 17.0                                                                                   | 25-157 | ALL               | dominant | 24.5                | 4.6      | 9-41  | 16.2 | 3.0   | 8-25  |
|                                                                                     | non-dominant | 93.1              | 27.6     | 27-160              | 53.9     | 15.7                                                                                   | 23-115 | non-dominant      | 23.6     | 4.8                 | 11-42    | 15.3  | 3.1  | 7-26  |       |
| NORMS FOR ADULT PINCH STRENGTH Tip Pinch strength performance of all subjects (lbs) |              |                   |          |                     |          | NORMS FOR ADULT PINCH STRENGTH Palmer Pinch strength performance of all subjects (lbs) |        |                   |          |                     |          |       |      |       |       |
| age                                                                                 | hand         | men<br>mean<br>SD | low-high | women<br>mean<br>SD | low-high | age                                                                                    | hand   | men<br>mean<br>SD | low-high | women<br>mean<br>SD | low-high |       |      |       |       |
| 20-24                                                                               | dominant     | 18.0              | 3.0      | 11-23               | 11.1     | 2.1                                                                                    | 8-16   | 20-24             | dominant | 26.6                | 5.3      | 18-45 | 17.2 | 2.3   | 14-23 |
|                                                                                     | non-dominant | 17.0              | 2.3      | 12-33               | 10.5     | 1.7                                                                                    | 8-14   | non-dominant      | 25.7     | 5.8                 | 15-42    | 16.3  | 2.8  | 11-24 |       |
| 25-29                                                                               | dominant     | 18.3              | 4.4      | 10-34               | 11.9     | 1.8                                                                                    | 8-16   | 25-29             | dominant | 26.0                | 4.3      | 19-35 | 17.7 | 3.2   | 13-29 |
|                                                                                     | non-dominant | 17.5              | 5.2      | 12-36               | 11.3     | 1.8                                                                                    | 9-18   | non-dominant      | 25.1     | 4.2                 | 19-36    | 17.0  | 3.0  | 13-26 |       |
| 30-34                                                                               | dominant     | 17.4              | 6.7      | 12-25               | 12.6     | 3.0                                                                                    | 8-20   | 30-34             | dominant | 24.7                | 4.7      | 16-34 | 18.3 | 5.0   | 12-34 |
|                                                                                     | non-dominant | 17.5              | 6.8      | 10-27               | 11.7     | 2.8                                                                                    | 7-17   | non-dominant      | 25.4     | 5.7                 | 15-37    | 18.1  | 4.8  | 12-32 |       |
| 35-39                                                                               | dominant     | 18.0              | 3.6      | 12-27               | 11.6     | 2.5                                                                                    | 8-19   | 35-39             | dominant | 26.2                | 4.1      | 19-36 | 17.5 | 4.2   | 13-29 |
|                                                                                     | non-dominant | 17.7              | 3.8      | 10-24               | 11.9     | 2.4                                                                                    | 8-16   | non-dominant      | 25.9     | 5.4                 | 14-40    | 17.1  | 3.4  | 12-24 |       |
| 40-44                                                                               | dominant     | 17.8              | 4.0      | 11-25               | 11.5     | 2.7                                                                                    | 5-15   | 40-44             | dominant | 24.5                | 4.3      | 17-37 | 17.0 | 3.1   | 10-23 |
|                                                                                     | non-dominant | 17.7              | 3.5      | 12-26               | 11.1     | 3.0                                                                                    | 8-17   | non-dominant      | 24.8     | 4.9                 | 15-37    | 16.6  | 3.5  | 14-23 |       |
| 45-49                                                                               | dominant     | 18.7              | 4.9      | 12-30               | 13.2     | 3.0                                                                                    | 9-19   | 45-49             | dominant | 24.0                | 3.9      | 19-33 | 17.9 | 3.0   | 12-27 |
|                                                                                     | non-dominant | 17.6              | 4.1      | 12-28               | 12.1     | 2.7                                                                                    | 7-18   | non-dominant      | 23.7     | 3.8                 | 8-33     | 17.5  | 2.8  | 12-24 |       |
| 50-54                                                                               | dominant     | 18.3              | 4.0      | 11-24               | 12.5     | 2.2                                                                                    | 9-18   | 50-54             | dominant | 23.8                | 5.4      | 15-36 | 17.3 | 3.1   | 12-23 |
|                                                                                     | non-dominant | 17.8              | 3.9      | 12-26               | 11.4     | 2.4                                                                                    | 7-16   | non-dominant      | 24.0     | 5.8                 | 16-36    | 16.4  | 2.9  | 12-22 |       |
| 55-59                                                                               | dominant     | 16.6              | 3.3      | 11-24               | 11.7     | 1.7                                                                                    | 9-16   | 55-59             | dominant | 23.7                | 4.8      | 16-34 | 16.0 | 3.1   | 11-26 |
|                                                                                     | non-dominant | 15.0              | 3.7      | 10-26               | 10.4     | 1.4                                                                                    | 8-13   | non-dominant      | 21.3     | 4.5                 | 12-25    | 15.4  | 3.0  | 11-21 |       |
| 60-64                                                                               | dominant     | 15.8              | 3.9      | 9-22                | 10.1     | 2.1                                                                                    | 7-17   | 60-64             | dominant | 21.8                | 3.3      | 16-28 | 14.8 | 3.1   | 10-20 |
|                                                                                     | non-dominant | 15.3              | 3.7      | 9-23                | 9.9      | 2.0                                                                                    | 6-15   | non-dominant      | 21.2     | 3.2                 | 15-27    | 14.3  | 2.7  | 10-20 |       |
| 65-69                                                                               | dominant     | 17.0              | 4.2      | 11-27               | 10.6     | 2.0                                                                                    | 7-15   | 65-69             | dominant | 21.4                | 3.0      | 15-25 | 14.2 | 3.1   | 8-20  |
|                                                                                     | non-dominant | 15.4              | 2.9      | 10-21               | 10.5     | 2.4                                                                                    | 7-17   | non-dominant      | 21.2     | 4.1                 | 14-30    | 13.7  | 3.4  | 8-22  |       |
| 70-75                                                                               | dominant     | 13.8              | 2.6      | 11-21               | 10.1     | 2.6                                                                                    | 7-15   | 70-75             | dominant | 18.1                | 3.4      | 14-27 | 14.4 | 2.6   | 9-19  |
|                                                                                     | non-dominant | 13.3              | 2.6      | 10-21               | 9.8      | 2.3                                                                                    | 6-17   | non-dominant      | 18.8     | 3.3                 | 13-27    | 14.0  | 1.9  | 10-17 |       |
| 75+                                                                                 | dominant     | 14.0              | 3.4      | 7-21                | 9.6      | 2.8                                                                                    | 4-16   | 75+               | dominant | 18.7                | 4.2      | 9-26  | 12.0 | 2.6   | 8-17  |
|                                                                                     | non-dominant | 13.9              | 3.7      | 8-25                | 9.3      | 2.4                                                                                    | 4-13   | non-dominant      | 18.3     | 3.8                 | 10-26    | 11.5  | 2.6  | 6-16  |       |
| ALL                                                                                 | dominant     | 18.3              | 4.6      | 10-31               | 11.0     | 2.7                                                                                    | 8-19   | ALL               | dominant | 23.4                | 5.0      | 9-45  | 16.3 | 3.8   | 8-34  |
|                                                                                     | non-dominant | 17.0              | 4.3      | 11-31               | 10.3     | 2.5                                                                                    | 7-18   | non-dominant      | 23.0     | 5.3                 | 10-42    | 15.7  | 3.6  | 6-32  |       |

**Finger Goniometer** – The finger goniometer can be used to measure active or passive joint range of motion (ROM). It measures joint flexion and hyperextension. It is calibrated in degrees.

Align the fulcrum of the goniometer with the anatomical fulcrum of the joint being measured. Place the flat arm of goniometer that is attached to the dial indicator on the center of the limb (or extremity) to be measured. Hold both arms of the goniometer and move the joint through its entire range-of-motion (this can be done actively by the subject or passively by the examiner.) The range of motion can be read directly from the dial indicator