

## CASE STUDY No. 5: La Chappelle-aux-Saints 1 (LC1)

In this activity, you will work through a case study of a single individual who exhibits changes in their skeleton resulting from experience of disease or injury during life.

You will consider the features of the individual (age, sex, and pathology). Taking into account their mortuary and lifeways contexts, you will then assess whether they likely required, and received, health-related care at some stage. Remember that 'health-related care' is defined along a continuum spanning 'hands-on, intensive care' at one end, and 'accommodation of difference' (i.e. adapting environment and expectations to allow participation) at the other.

Note: As in most bioarchaeological research, you may not have all the data you would like in order to be completely confident in your conclusions. Hint: focus on the likely impacts of the skeletal changes (described below) on ability to function independently, and to fully participate, in the specific community setting at that particular time in history.

Read the case study and complete the *Short-Form Index of Care* to the best of your ability. Refer to the Glossary on the final page for brief definitions of unfamiliar terms.

### MORTUARY CONTEXT:

- Skeletal remains of the Neandertal LC1 were recovered from a grave at the entrance of a cave near the village of Chappelle-aux-Saints, France (Figs. 1 and 2).
- Remains date to between 50,000-60,000BP. No other burials found in the near vicinity.

### THE INDIVIDUAL (LC1):

- LC1 was male; 50+ years at death; ~75% of his skeleton represented, with generally good preservation.
- Cause of death is unknown, very possibly result of chronic, latterly systemic, infection.
- This was an intentional burial in a rectangular, flat-bottomed pit. LC1's remains were found in articulation, laid supine on a west-east axis with legs flexed to the right (Fig. 3). Animal bones and stone tools were found in association with his remains.

### LIFEWAYS CONTEXT:

- Society: small, highly mobile, kin-based, mixed-age groups (up to ~25 people), moving between short-stay camps with domestic use of caves and rock shelters as available.
- Landscape: steep-sided river valleys, limestone cliffs, cold climate woodland interspersed with grassy plains.
- Climate: dry, cold to very cold (average min: < -15° Celsius, average max: -2 to +15 ° Celsius).
- Economy: subsistence hunting. Diet: primarily large mammals, less frequently smaller game. Possibly occasional plant consumption. Health: skeletal evidence for high levels of physical activity in both sexes, with high frequencies of hunting-related trauma.

## **PATHOLOGY:**

N.B. The multiple pathologies evident in LC1's remains would likely interact to affect functioning capability and general health. These pathologies include:

- extensive (>50%) antemortem tooth loss, severe and chronic dental and periodontal disease, and temporomandibular joint disease (Fig 4);
- severe vertebral degeneration extending from C5 – T3; degeneration in the lower thoracic spine likely arising from trauma to the T10-T11 region; a healed rib fracture; and pathology (degeneration + disease) in the lower lumbar spine (L4-L5 and L5-S1) severely restricting bending, flexion, and extension (Fig. 5);
- moderate osteoarthritis in both shoulders, minor osteoarthritis in both elbows (Fig. 5);
- severe degeneration of, and chronic osteomyelitis in, the left hip joint (Fig. 6):
  - degeneration most likely the result of trauma (possibly that impacting T10-11) experienced at least 1-2 years before death;
  - osteomyelitis (severe infection in the bone) possibly resulting from trauma (above), most likely arising from bloodborne pathogens originating in dental / periodontal infection. Osteomyelitis was active for a minimum of 6-12 months before death. It would exacerbate joint degeneration; cause significant pain, impact mobility; and undermine immune system and more general organ system function.

### **YOUR TASK:**

On the basis of the information above, fill out the *Short-Form Index of Care*. Keep in mind that more than one condition might be operating to affect LC1's experience, and that individual health conditions may interact to affect overall experience. In summary, here are the questions you will be addressing:

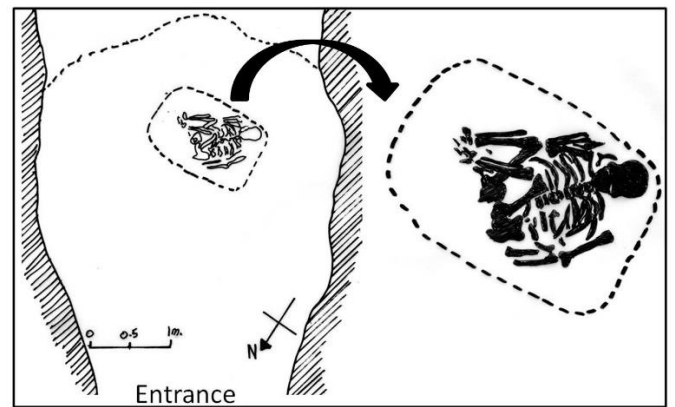
- Based on the skeletal evidence for pathology presented above, what kind of clinical and functional impacts do you think LC1 likely experienced?
- Given the lifeways context, could LC1 have looked after himself, or was care from others in his community likely needed to help him to manage these impacts?
- If LC1 needed care from others, what kind(s) of care do you think might have been required, and who might have provided this care? (Note: people can receive different types of care either at the *same* time (to address different impacts) or at *different* times (as their condition improves or worsens).



**Figure 1:** Map of France, showing the village of La Chapelle-aux-Saints and the entrance to the cave in which LC1 was found.

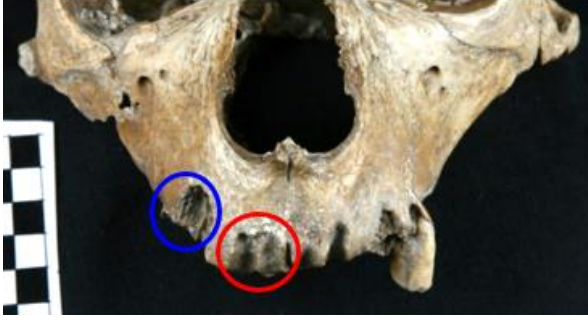
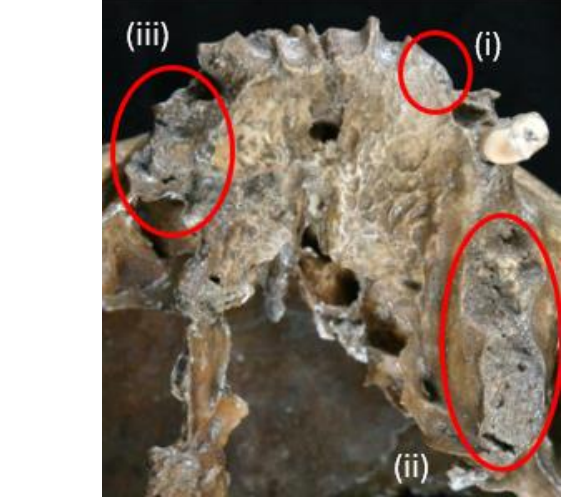




**Figure 2:** Recreation of the remains of LC1 *in situ*. Musée de l'Homme de Néandertal, La Chapelle-aux-Saints, <https://www.donsmaps.com/chapelleauxsaints.html>

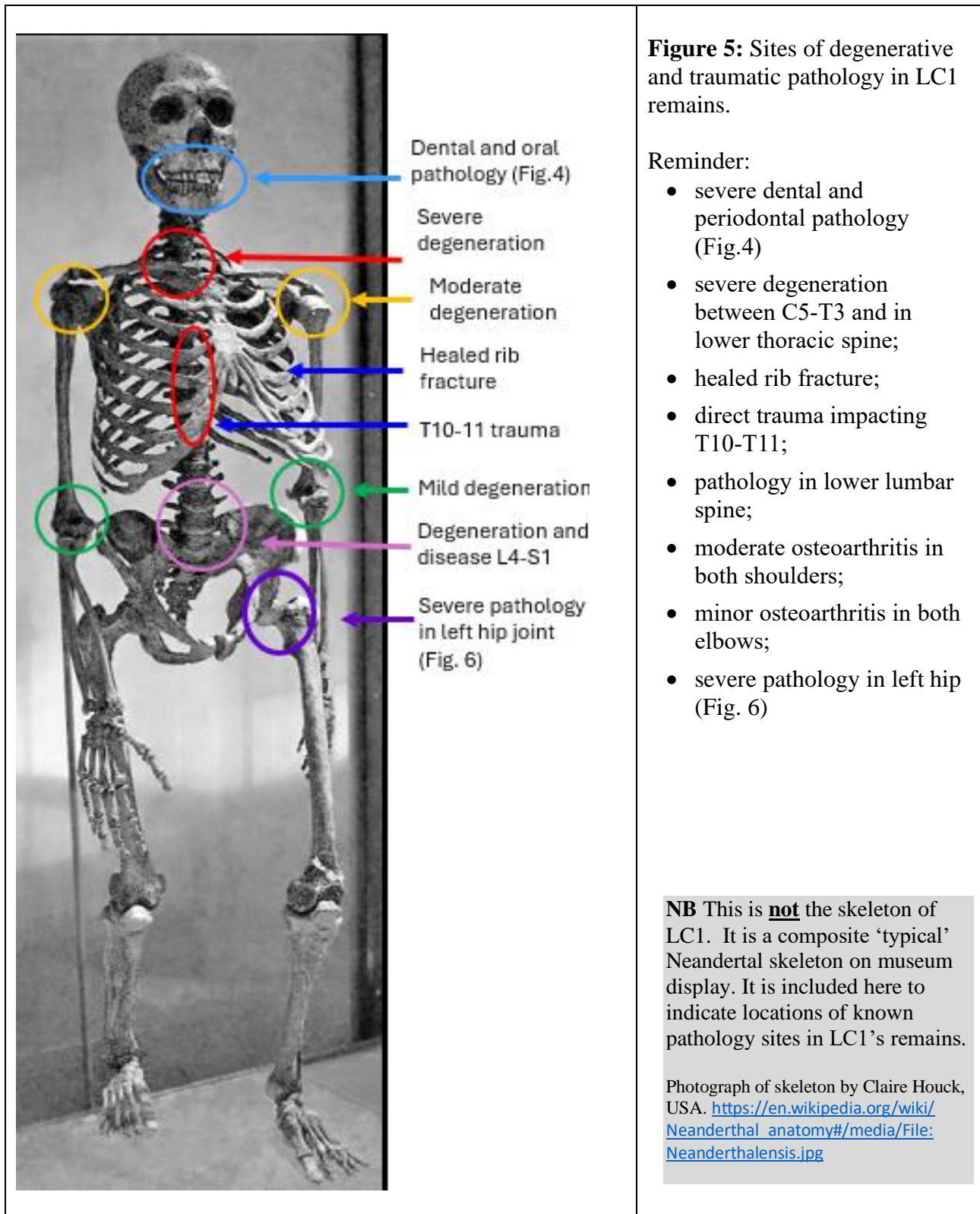


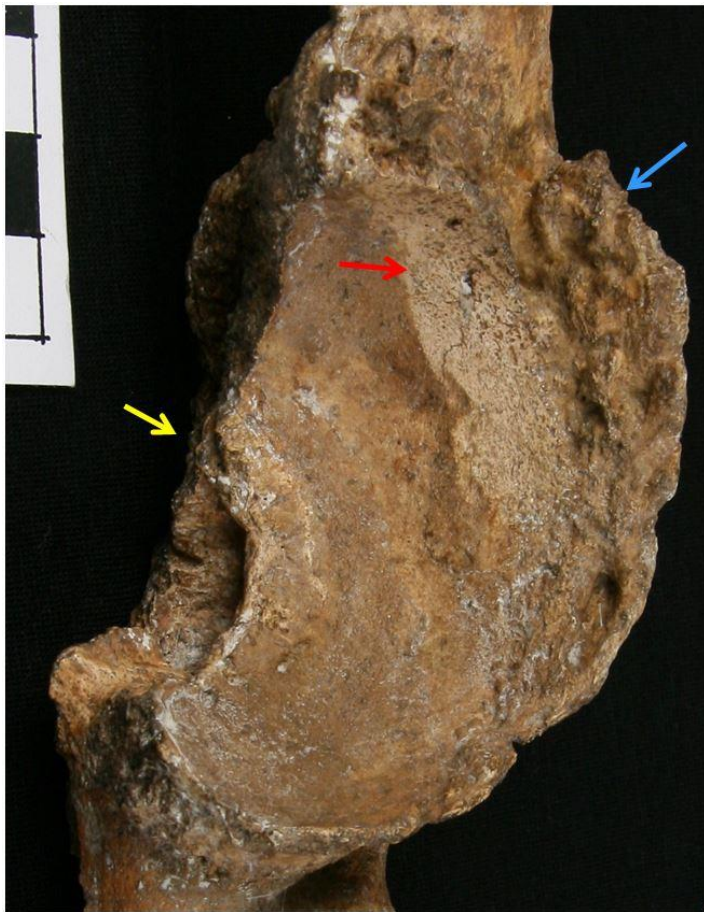
**Figure 3:** Sketch of LC1's remains at time of discovery

(After the original by Bouyssonie, 1908.)

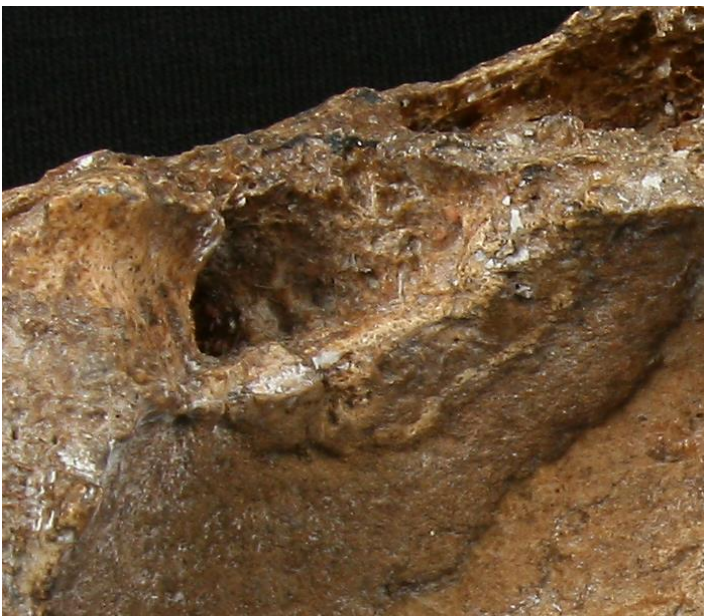
	<p>(a) Frontal view of the LC1 maxilla, with alveolar resorption (red) indicating antemortem loss of the two right frontal incisors and (blue) an apical abscess straddling the right canine and first premolar.</p>
	<p>(b) Palatine view of the LC1 maxilla, with alveolar resorption (red) indicating antemortem loss of the left canine (i) and left molars 1-3 (ii), and both right premolars (iii).</p>
	<p>(c) Frontal view of the LC1 mandible, showing (blue) widespread infection extending across the anterior surface with associated antemortem loss of the right first premolar, right canine and both right incisors and complete alveolar resorption (red) at the right premolar 2 and right molars 1-3, (signifying tooth loss many years before death).</p>
	<p>(d) Superior view, LC1 right mandibular condyle: significant lipping, distortion, and pitting of surface visible, indicative of temporomandibular joint degeneration</p>

**Figure 4 (a-b):** Images illustrating extensive antemortem tooth loss, chronic and severe dental and periodontal disease, and degenerative activity in the right temporomandibular joint in LC1 remains.





(a)



(b)

**Figure 6:** Evidence for pathology in LC1 left hip joint.

**(a):** Lateral aspect of left acetabulum. **Blue arrow** indicates exostosis; **red arrow** indicates area of severe eburnation; **yellow arrow** indicates lytic activity at the acetabular notch.

**(b):** Detail of infectious activity at the left acetabular notch.

## GLOSSARY: Case Study No. 5 - LC1 \*

\* For more detailed definitions refer to your text books or a dictionary.

- **Neandertals** (also sp. Neanderthals): members of the species *Homo neanderthalensis*, our closest known human relatives on the evolutionary tree. This now extinct group of archaic humans inhabited Eurasia up to about 40,000 years ago.

### Pathology

- **Eburnation:** the wearing down of cartilage at the articulating surface of a bone (i.e. in a joint – in the case of LC1, the hip joint). This exposes the underlying bone, and bone-on-bone friction results in the contact bone surface becoming dense and smooth. It signals the final stage (Stage 4) of osteoarthritis.
- **Exostosis:** formation of new bone extending outwards from the surface of an existing bone. It can be triggered in response to trauma to, or ‘wear and tear’ on, the existing bone.
- **Lytic lesion:** an area of bone destruction, which manifests as one or more ‘holes’ penetrating the bone surface, and typically results from a disease such as osteomyelitis (see below) or cancer.
- **Osteomyelitis:** infection of the bone, caused by bacteria transmitted through the bloodstream or from adjoining tissue. Symptoms may include fever, bone pain, swelling, fatigue, general weakness, and a depressed immune system.
- **Systemic:** a ‘systemic disease’ is one which affects the entire body.

### General terms

- **Acetabulum:** the cup-shaped socket on the lateral (outward facing) side of the hip bone. The head of the femur sits inside the acetabulum to form the hip joint.
- **Alveolar:** relates to the bony ridge in which the tooth sockets are situated.
- **Antemortem:** before death.
- **Apical abscess:** a pocket of infection inside the root canal of a tooth. Usually localized, in some cases this infection may spread to other parts of the body through the blood stream.
- **Extension:** muscle extension – increasing the angle between two bones (e.g. straightening a leg).
- **Flexion:** muscle flexion – decreasing the angle between two bones (e.g. bending a leg).
- **Periodontal:** refers to the general structures which surround and support the teeth – gums, tooth roots, jawbone (‘alveolar’, see above, is a more specific term).
- **Temporomandibular joint:** the joint which connects the mandible (lower jaw) to the temporal bone of the skull.