A simple idea

This project began with a simple idea that clinicians usually diagnose Bones, Joints and Soft tissue diseases based on clinical and radiological information. Pathological assessment is often confirmative and late in the management process.

Medical year 4 students rotate through Orthopaedic modules on August each year and studied imaging during this period. Before this project, ACP provide two courses of pathology, namely MEDU 3600 and MEDU 3310, which teach students with pathology specimens only. These students need to do the critical radiological-pathological correlation on their own, without guidance.

I was grateful that The Micro-Module Coursewear Development Grant had supported my proposal to do specimen X-rays of the existing gross pathological specimens of The Bones, Joints & Soft Tissue system of The ACP museum, so that students can understand easily such a difficult area at such an early stage of their medical education.

Difficulties

Two of the biggest difficulties were the confirmation of project budget and the arrangement of taking X-rays in the Department of Imaging and Interventional Radiology, PWH.

I applied the grant on Mar 2017. The application of this project was successful on May 5, 2017. The approval of the project proposal was, however, only at the end of Nov 2017. Additional five months (Nov 2017~Mar 2018) was required for trial X-rays, and to confirm arrangements of X-ray taking in the Radiology Department. Finally, on Apr 2018, all specimen X-rays were done within five working hours.

Retrospectively, I have underestimated the time required for going through all the procedures. This is also the reason why this report was late.

Biggest surprise

The main idea was the help medical year 4 students to understand pathology better. The big surprise, turned out to be the arousal of enthusiasm towards pathology among student helpers, who are medical year 1 and year 2 students.

They accepted the challenge, studied on their own, in advance, in research areas of

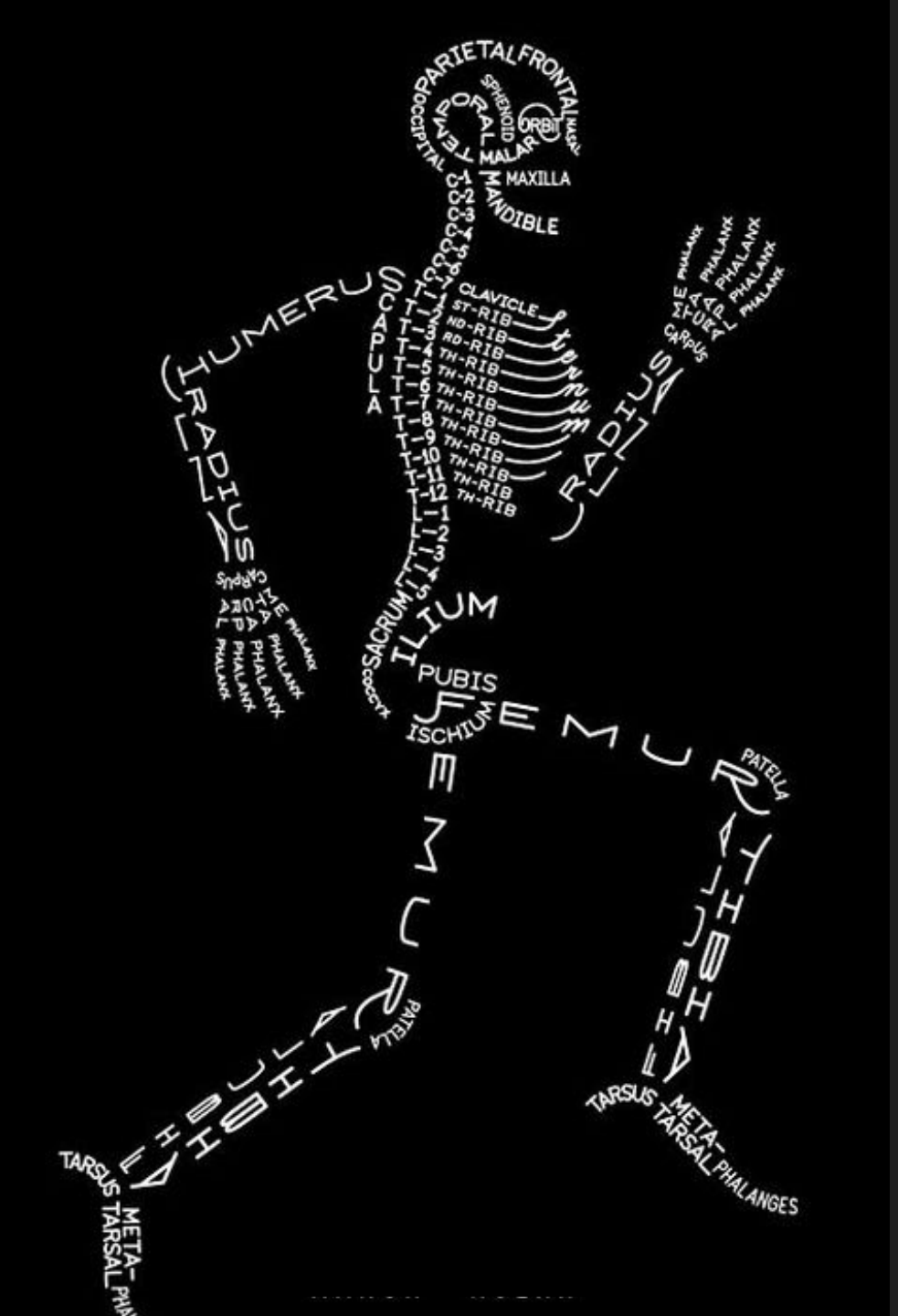
Bones, Joints and Soft Tissue Tumor pathology. By doing so, they not only gained the knowledge in advance, but they also understood the limitations of imaging (X-ray, at least) in diagnosing Bones, Joints and Soft tissue pathology!

To me, this was the most satisfying part of this project. After all, the main goal of medical education is to arouse the interest of budding doctors in the right field, right?

A power point from a student helper

I could not resist the temptation to conclude this project with the power point of one of the student helper, Mok Hiu Tung, a CUHK medical year 1 student at the time of the project.

This illustrated how this project generates the interest of a junior medical student in a difficult medical subject.



Radiology–Pathology correlation project

Bones, Joints and Soft tissue

Mok Hiu Tung

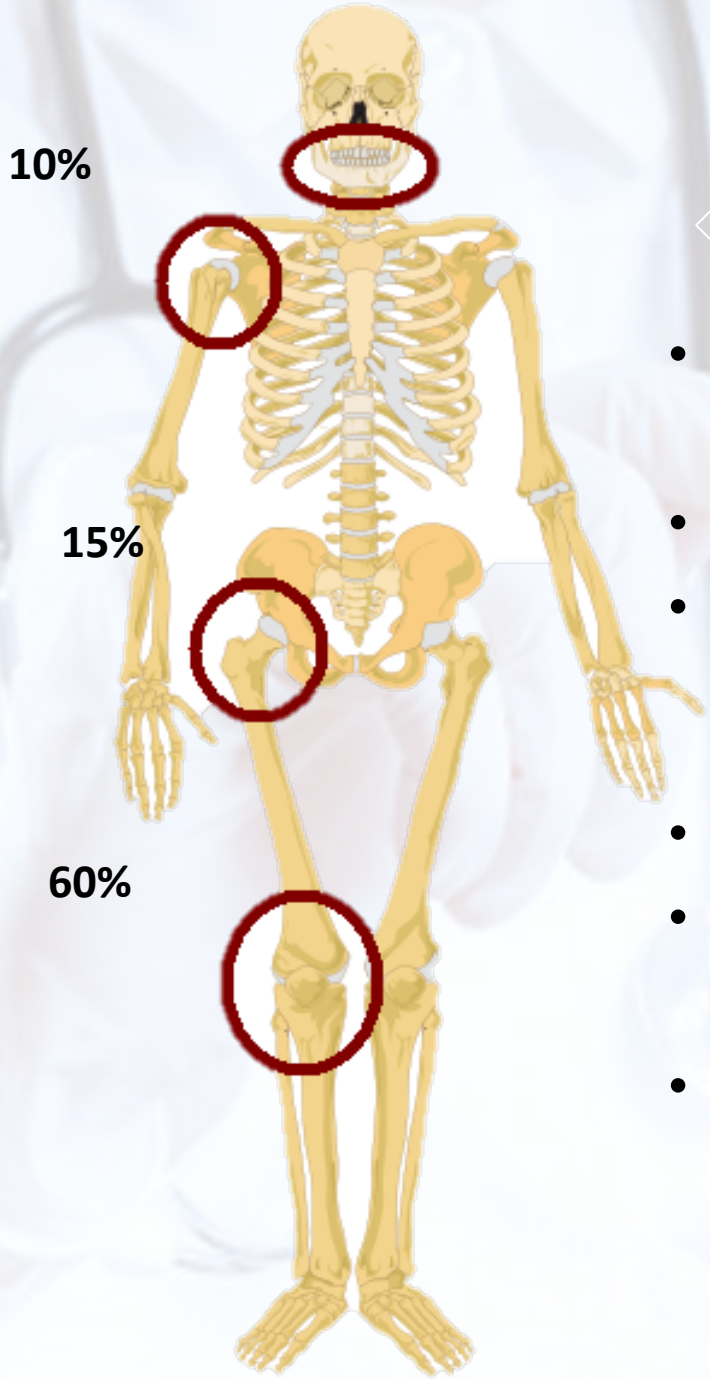
Reason of choosing these specimen

- not most lethal disease
- **most common disease** in this system:
the most common histological form of primary bone

- Hard to aware at the early stage of disease.
- Pain →night stage
- Bone fracture → first symptom

- **most prominent in teenager (75%)**
- active in sport may have a higher chance

- No specific prevent measure



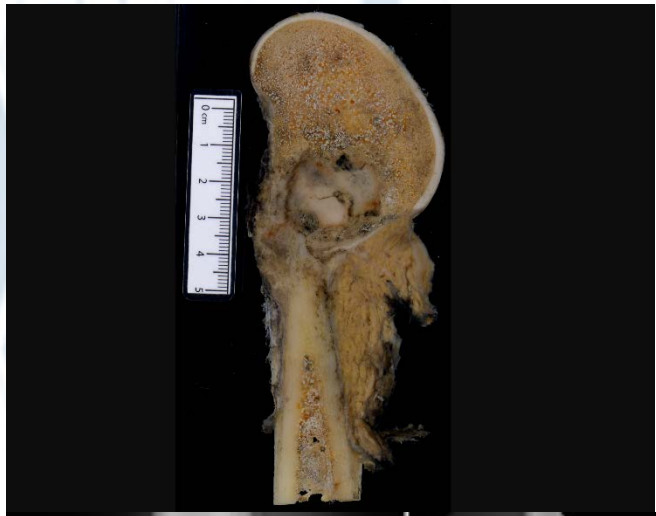
Osteosarcoma

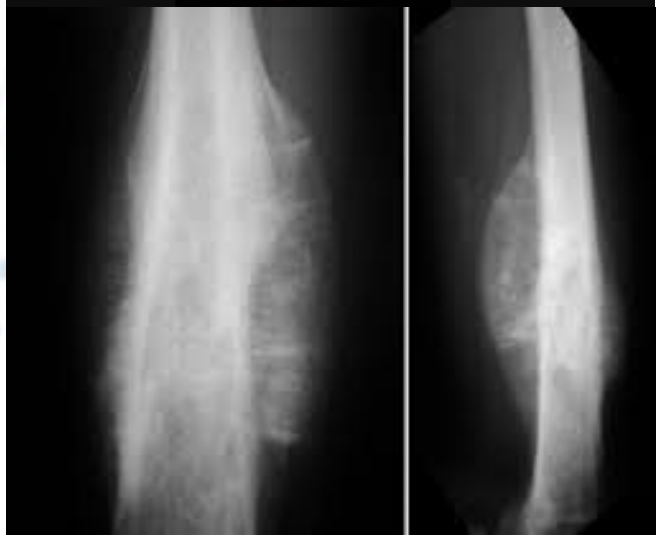
- Aggressive malignant tumor

- transformed cells of mesenchymal origin
- **produces malignant osteoid matrix or mineralized bone**

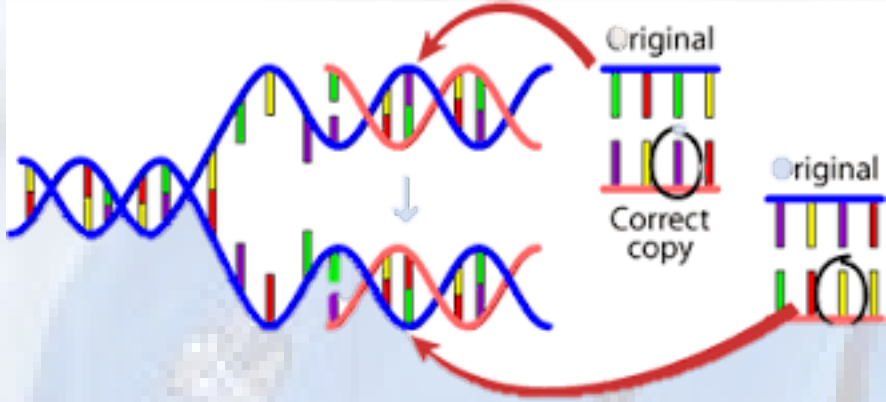
- bone-forming tumor
- site of bone growth

- **the proximal end of tibia or humerus, distal end of femur**





Osteosarcoma - Cause



- In teenager and young adult:

  Deletion of chromosome 13q14 inactivates the retinoblastoma gene

- Secondary osteosarcoma in older adult: (predispose of osteosarcoma):

  Bone dysplasia

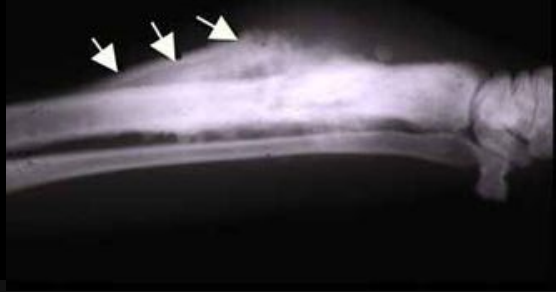
  Bone infarcts

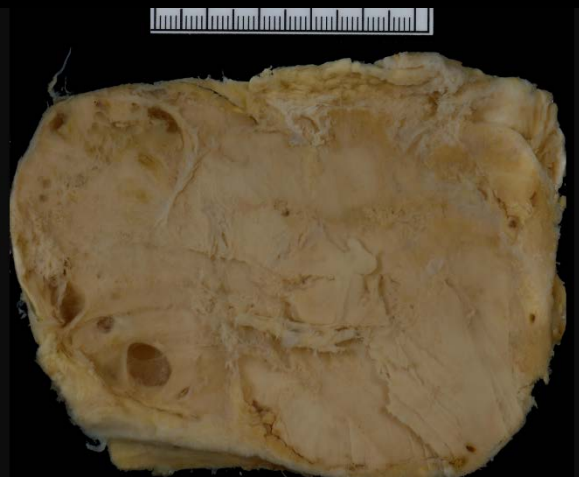
  Previous radiation

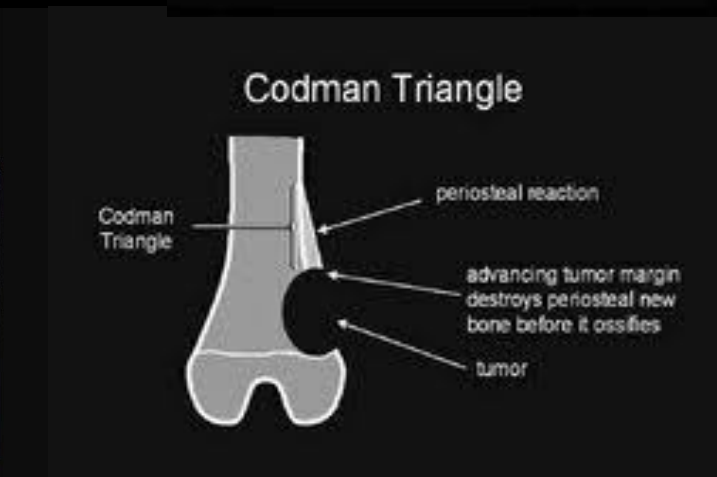
- fluorination of drinking water → no direct relation

Osteosarcoma – Diagnosis and Pathological observation

- X-ray + a combination of scans which include CT, PET scan, bone scan and MRI
    - Tumor grow to the periosteum → **Codman's triangle** under x-ray, due to subperiosteal lesion
- films → suggestive, cannot tell whether it is malignant or benign.
- **Biopsy** → only definitive diagnosis method, require surgery to get the tissue out
    - solid, hard, irregular due to the tumor spicules of calcified bone





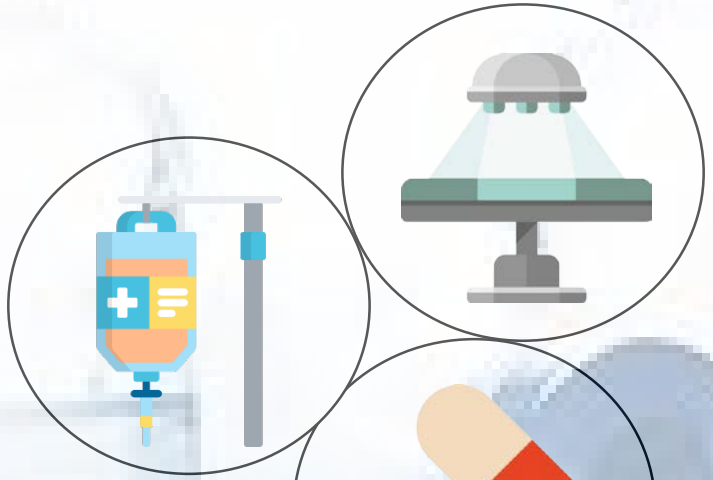


Osteosarcoma - Treatment

- It is usually treated with a multimodality approach which include:

- Surgery: complete resection
- 90% → limb-salvage surgery
- The percentage of tumor cell necrosis → whether the chemotherapy strategy is correct or need to be altered

- Neoadjuvant chemotherapy: chemotherapy before surgery to kill most of the cancerous cell

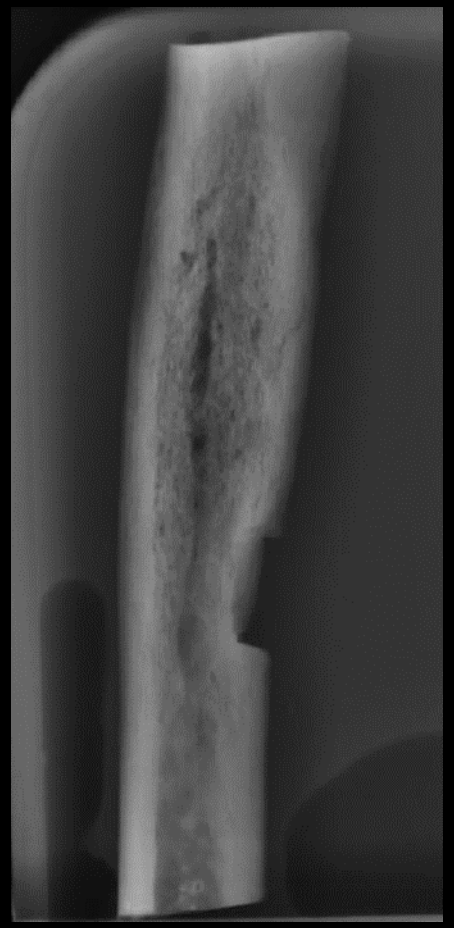


- Chemotherapy: mifamurtide
  → chemotherapy after surgery
  → kill the remaining cancerous cell and to reduce the risk of cancer recurrence

CU2001 – Osteosarcoma of left femur

- Observation of gross specimen: creamy white structure
- Observation of the X-ray slide: white dots in the affected area (when compared to the other part of spongy bone, which is due to greater calcium content

CU 2264b – Osteosarcoma of right humerus

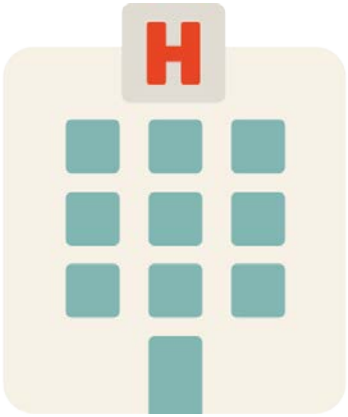


- The tumor has affected the compact bone
- There seems to be a Codman triangle (not sure), if yes, this indicate the tumor has penetrate the compact bone and lift up the periosteum

Story

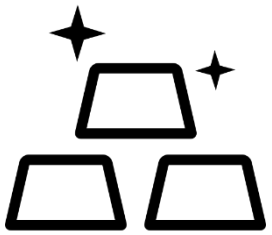
- A boy from rich family living in a developing country suffer from femoral pain

- sudden femoral fracture
- best private hospital in the country

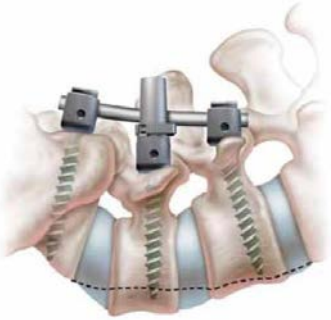


- limb-salvage surgery

- metal scaffold has to be inserted into bone for support
- creative idea: the metal scaffold to be made white gold

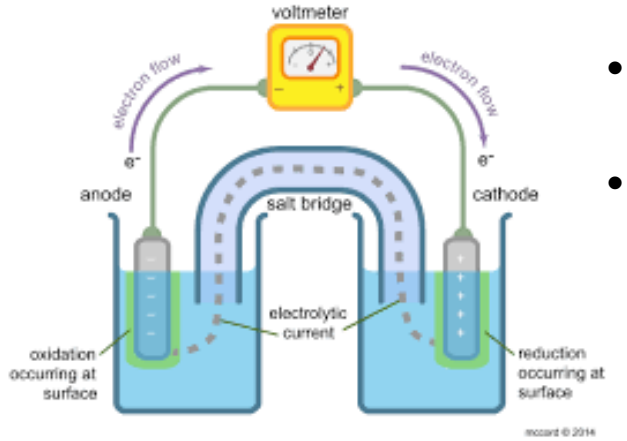


- Hospital want to earn money → agreed



- But in order to earn greater portion of money, when the hospital was customizing the scaffold for the boy, they only made the **nails in white gold**, but the **other part with cheaper alloy** composed of iron…

- One week after the surgery, the boy complaint that the surgical part was sometimes warm, if not a bit hot, and he can hear some buzz buzz sound
- Some may think that it is caused by phantom limb effect, which the cut neurons is still producing signal



- electrochemical series of element
- the scaffold is made of metal of different voltage → current that generate heat and sound

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