原文題目(出處)：	Tumor-induced Osteomalacia: A Sherlock Holmes Approach to Diagnosis and Management *Ann Maxillofac Surg 2017;7:143-7*
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Introduction

- Sherlock Holmes Approach
  1. Assume a given problem is solvable.
  2. Establish criteria for an acceptable solution.
  3. Rule out all the approaches to solving the problem that don't meet the necessary criteria.
  4. Select your solution(s) from among the remaining approaches.
- hypophosphatemic osteomalacia
  - X-linked hypophosphatemic rickets, autosomal-dominant hypophosphatemic rickets (ADHR), tumor-induced osteomalacia (TIO)

  1. proximal renal tubular phosphate reabsorption ⬇
  2. 1,25-dihydroxyvitamin D [1,25(OH)2D] or calcitriol.(骨化三醇) ⬇

- Fibroblast growth factor (FGF23)
  - regulation of phosphate homeostasis
  - secreted by osteocytes and osteoblasts
  - inhibits both sodium-phosphate (NaPiT-IIa and IIc) cotransport system on the basolateral membrane and cytochrome p450 27B1 (CYP27B1) of proximal renal tubules, which catalyzes the hydroxylation of Calcifediol to calcitriol (the bioactive form of Vitamin D)
  - Overproduction : neurofibromatosis type 1 (NF-1), epidermal nevus syndrome, McCune–Albright syndrome, and fibrous dysplasia.

- Tumor-induced osteomalacia(TIO)
  - rare paraneoplastic syndrome
  - acquired hypophosphatemic osteomalacia

Case Report

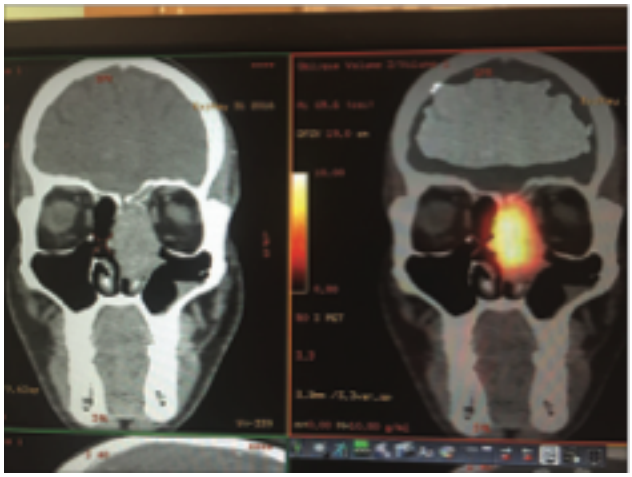
- 31 y/o male patient , who fractured his both forearms 6 months ago.
- painless chest deformity, generalized body pains for 2 years, difficulty in walking for 1 year, finally limited to wheelchair.
- no history of fever, rash, joint swelling, and weight loss.
- Past and family history with no similar complaints

First time examination

- orthopedicians Initial diagnosis : ankylosing spondylitis(僵直性脊椎炎)、bilateral sacroiliitis（雙側骶髂關節炎）、psoriatic arthritis（牛皮癬關節炎）
- basic biochemical workup：
  A. ↔ : serum calcium, Vitamin D, and parathyroid hormone (PTH)
  B. ⬆: alkaline phosphatase(鹼性磷酸酶)
  C. Serum phosphate was never included in tests

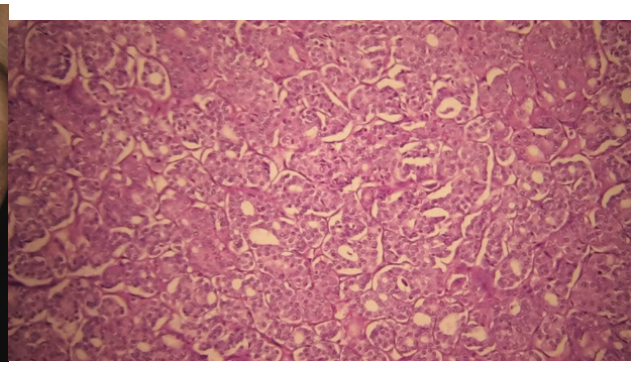
Second time examination

- blood pressure 124/84 mm of Hg, weight 63 kg, supine length 156 cm
- Biochemical parameters :
  A. ↔ : serum calcium
  B. ⬆ : serum alkaline phosphatase、FGF23(ELISA technique)
  C. ⬇ : serum phosphate、Serum 1,25(OH)2D、tubular maximum reabsorption of phosphate/glomerular filtration rate
- osteopenia of dorsal spine：
  A. 9th, 10th, and 11th right thoracic rib
  B. 9th and 10th left thoracic rib
  C. wedge compression of D8, D9 vertebra
- To detect the source of FGF23, 68-Gadolinium DOTANOC positron emission tomography-computed tomography (PET-CT) scan of whole body :

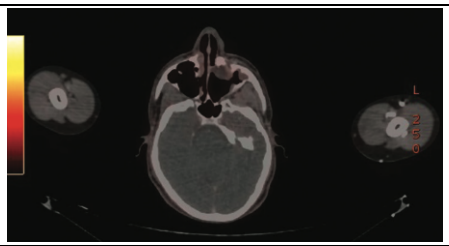


a well-defined heterogeneously mass lesion 37 × 24 × 43 (anteroposterior × transverse × craniocaudal) mm in left nasal cavity with erosion of left middle turbinate and medial wall of left maxillary antrum

- phosphate reached normal range after 1 week
  FGF23 reached normal range after 1 month
  1,25(OH) 2D reached normal range after 1 month
- Histopathology :
  mesenchymal tumor with no atypical mitoses or Infiltrative margins



3 month follow-up:



Disgussion
A. These tumors are hemangiopericytomas , sarcomas, ossifying fibromas, granulomas, giant cell tumors, and osteoblastomas
B. Its clinical and radiological features like osteomalacia. (Bone pains, fractures, muscle weakness, and fatigue)
C. lower limbs and craniofacial areas
D. oversecretion of FGF23
E. Scan : indio-pentetreotide or octreotide scintigraphy
F. Treatment : accurate localization, complete surgical removal .
G. Confirming : differential venous sampling for full-length FGF23 (half-life is 46–58 min and biochemical cure can be predicted at 6 h)
H. The main DD is primary hyperparathyroidism, sometimes they coexist （elevated serum calcium and PTH levels）

hemangiopericytomas
A. solitary fibrous tumor
B. Sex : none
C. Age : adult
D. Site : buccal mucosa
E. slow-growing
F. painless

In our case
A. The main DD is ADHR , present severe bone pain, pseudofractures, and weakness.
B. absence of family history , severity and rapid progression of symptoms, tumor histopathology examination , made this unlikely

題號	題目
1	Which option is not the condition of vitamin D deficiency ? (A) osteomalacia (B) rickets (C) Hypocalcification of the teeth (D) anemia
答案(D)	出處：P771,Oral and Maxillofacial Pathology, 4ed.
題號	題目
2	Which option is not associated with overproduction of fibroblast growth factor 23 (FGF23) ?
	(A) Jaffe-Lichtenstein syndrome (B) McCune-Albright syndrome (C) Behcet syndrome (D) Mazabraud syndrome
答案(C)	出處：P308,P594 ,Oral and Maxillofacial Pathology, 4ed.