



# Galectin-1

**A powerful diagnostic marker to distinguish  
chondroblastic osteosarcoma and conventional  
chondrosarcoma**

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Le Guelec, P Brousset, MB Delisle and C Schiff**

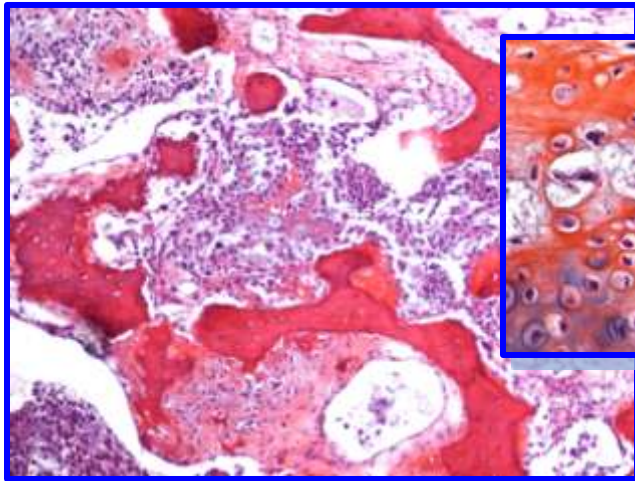
**Pathology's laboratory of Prof MB Delisle  
Rangueil's Hospital, Toulouse, France**

**EMSOS Birmingham 5-7<sup>th</sup> 2010**

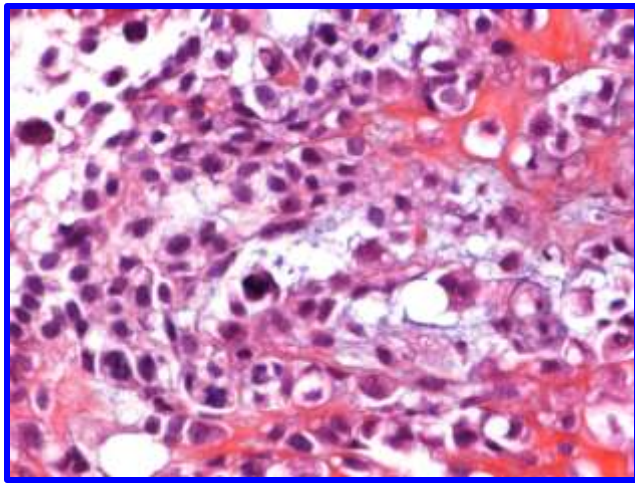
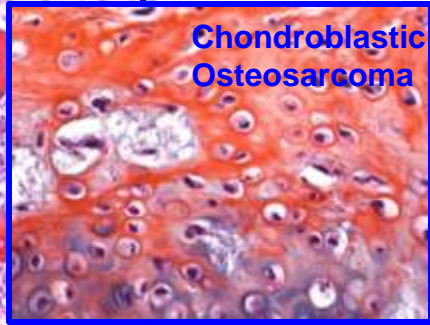
OS and CS → 2 of the most common types of primary bone malignancy

Osteosarcoma (35 %)

**Osteoid matrix**

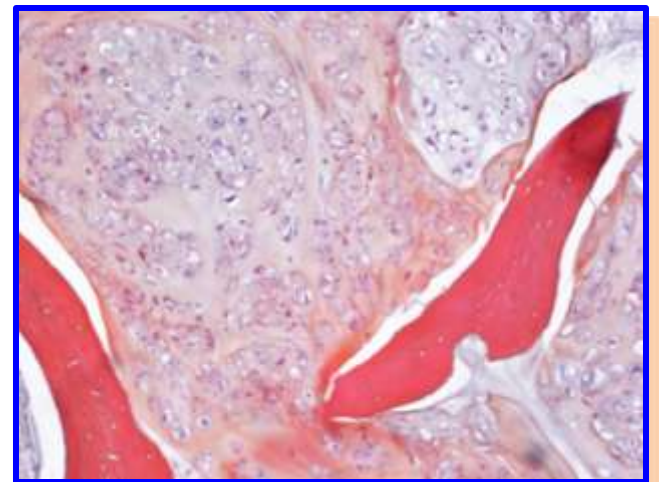
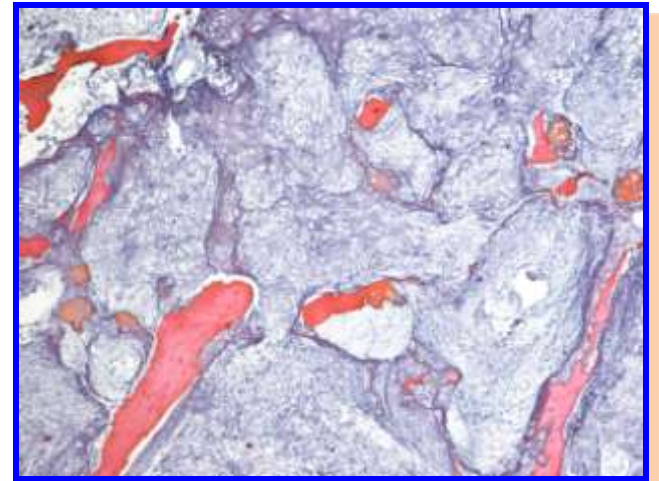


Chondroblastic  
Osteosarcoma

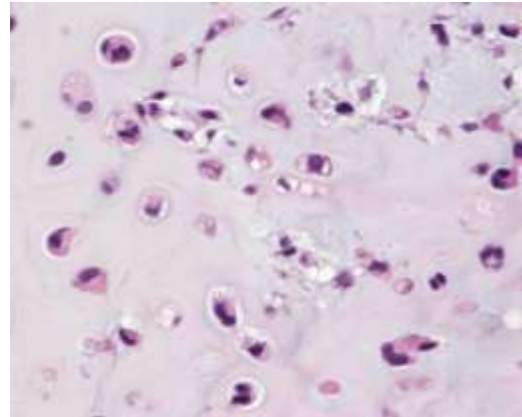
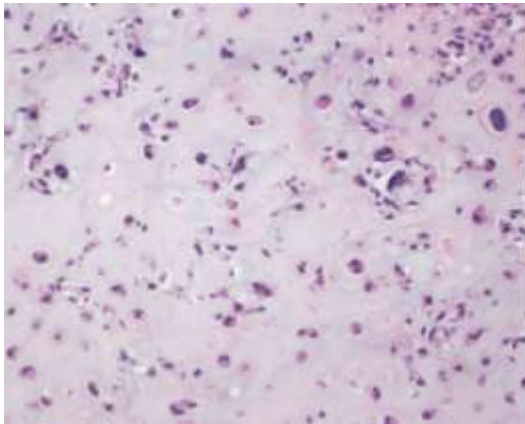


Chondrosarcoma (25 %)

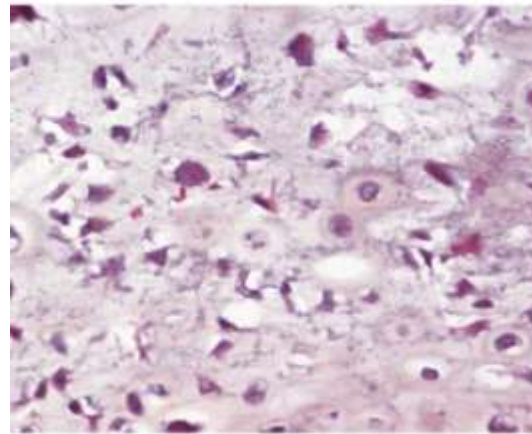
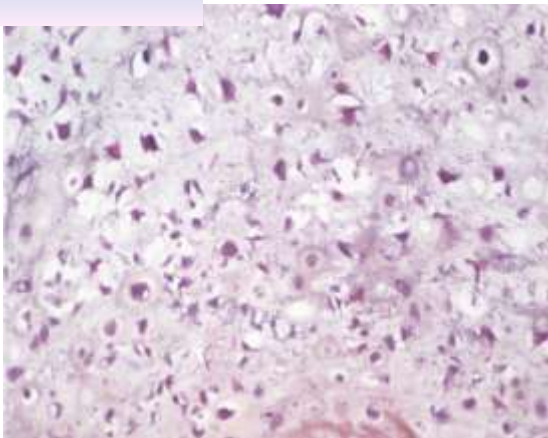
**Chondroid matrix**



Differential diagnosis is sometimes impossible in small biopsy samples when the osteoid component of CO is not present



Chondroblastic  
Osteosarcoma (CO)



Conventional  
Chondrosarcoma (CC)

# Different therapeutic management

**High grade Osteosarcoma**

**= Conventional  
Osteosarcoma**

**Neoadjuvant  
chemotherapy**

**+**

**Surgical resection**

**Chondrosarcoma**

**Exclusively  
surgical resection**

# Osteoblast marker?

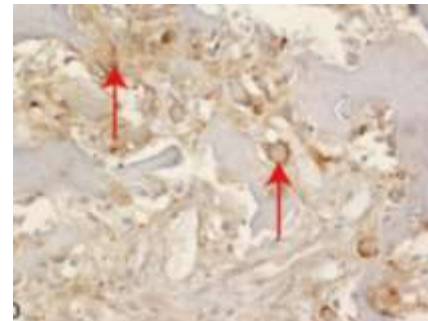
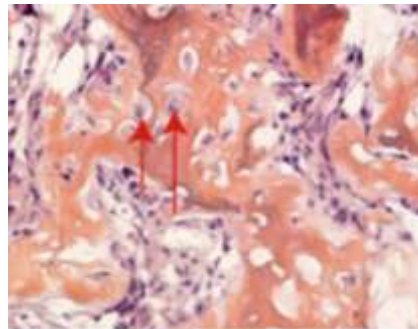
- There is **no diagnostic marker** to discriminate accurately between OS and CS

- **Ezrin expression** = Helpful, but is not always informative

*Salas S et al Virchows Arch. 2009 Jan;454(1):81-7.*

## - **Galectin-1**

- = A **good candidate** as it is expressed by normal murine osteoblasts but not chondroblasts
- Belongs to the family of calcium-independent Lectins that bind to B-galactoside derivatives
- GAL-1 is present at high levels in human osteoblasts from reactive proliferation and benign tumors suggesting that **Gal-1 might be used to identify bone tumors of osteoblastic origin**



Osteoblastoma

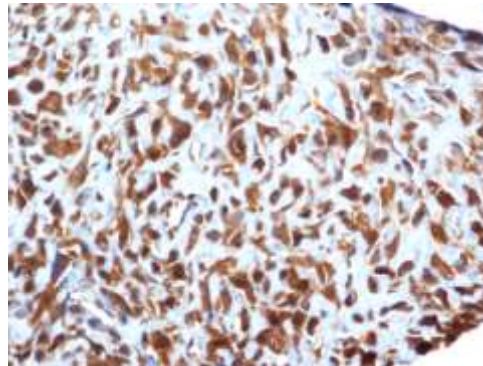
# Materials and methods

## Immunohistochemistry

- GAL-1 immunostaining on 165 malignant bone tumor biopsies of various types
  - 87 Osteosarcoma and 78 Chondrosarcoma
- 25 chondroblastic OS
- 66 conventional chondrosarcoma



TMA



Membrane and cytoplasmic staining

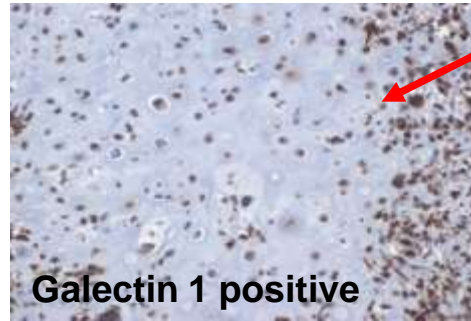
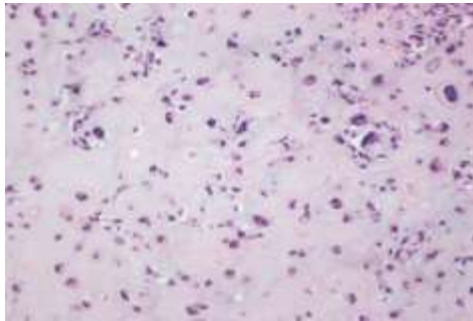
## Western Blot

- 2 Chondroblastic Osteosarcoma
- 2 Conventional chondrosarcoma

# Immunohistochemistry

# Results

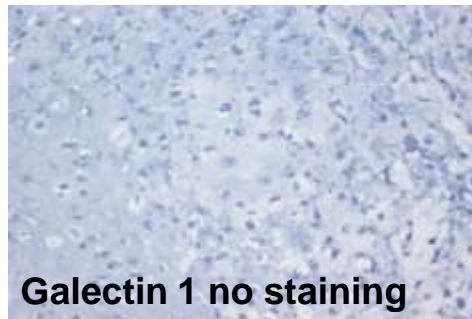
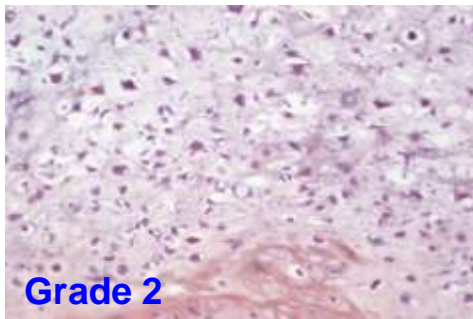
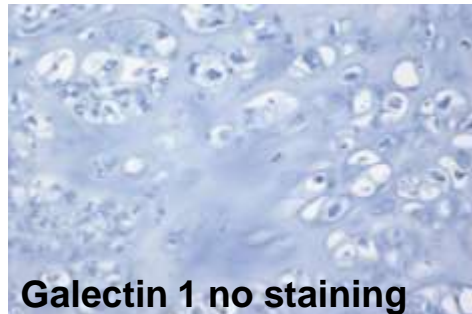
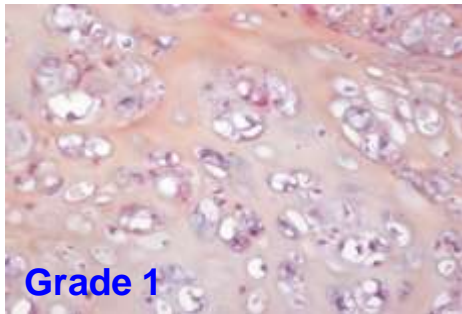
## Chondroblastic osteosarcoma



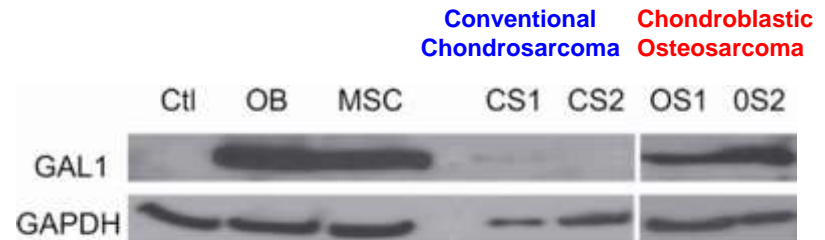
CO: High levels of GAL-1 staining, when either the number of labeled cells or the labeling intensity was considered

CC: negative +++

## Conventional chondrosarcoma



## Western Blotting for GAL-1



Presence of GAL-1 protein in CO, Absence in CC

→ Presence of GAL-1 is a powerful discriminating diagnostic marker for CO

## Statistical analysis of GAL-1 staining in OS versus CS

Groups (%)	Conventional Chondrosarcoma n = 66		Chondroblastic Osteosarcoma n = 25		Sensibility were high in each staining category	Specificity
	Nombre	%	Nombre	%		
0	54	81.8	2	8	68	95.5
1-5	4	6	2	8		
6-25	5	7.5	4	16		
26-50	2	3	6	24		
51-75	0	0	4	16		
76-100	1	1.5	7	28		

→ Significant difference in GAL-1 staining between chondroblastic osteosarcoma and conventional chondrosarcoma ( $p < 10^{-4}$ ), with a high GAL-1 expression in CO when compared with CC (Chi<sup>2</sup> coefficient)

ROC curve → is the tool of choice for evaluating a test's diagnostic performance

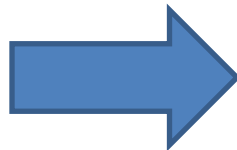
→ Determine the optimal cut-off values to discriminate between CO and CC

→ 26 % of stained cells and ++ staining intensity were the most discriminative values

# Diagnostic test

% of stained cells	Staining intensity	Diagnostic
≥ 26%	≥ ++	OS
≥ 26%	< ++	OS
< 26 %	≥ ++	OS
< 26 %	< ++	CS

Sensitivity: 72%  
Specificity: 95,5%  
VPP: 85,7%  
VPN : 90%



**Discriminant and robust  
Diagnostic test**

# Conclusion

GAL-1 is a powerful marker of OS  
and must be systematically searched in  
malignant bone tumors with chondroid component

## **The combined analysis of GAL-1 and ezrin staining**

- Will be more efficient to diagnose such sarcoma
- Will help oncologists to decide when to propose neoadjuvant chemotherapy