A proteomic analysis of skeletal muscle in HspB1 knock-out mouse

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A PROTEOMIC ANALYSIS OF SKELETAL MUSCLE OF HSPB1-NULL MOUSE

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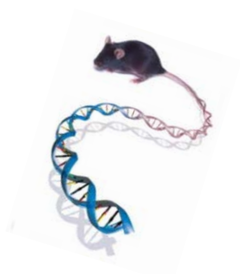
BACKGROUND

Hsp27 is a member of the small heat shock proteins (sHsp, 12-43 kDa) family

There is increasing evidence to substantiate Hsp27 as biomarker in many disease states including renal injury, cancer, cardiovascular disease, and neuro-degenerative disease. Abundance of Hsp27 is the highest in skeletal muscle (Neufer et Benjamin 1996) indicating a crucial role for muscle physiology.



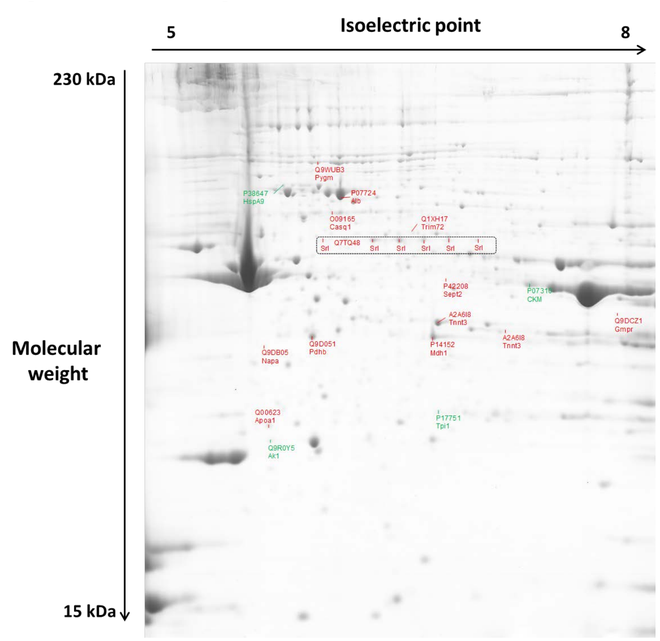
→ HspB1-null mouse to address the role of Hsp27 in muscle development, physiology and structure

- viable, fertile, no apparent morphological nor anatomical alterations
- abnormalities in the myofibrillar structure and muscle ultrastructure

AIM AND STRATEGY

Comparative proteomics

The aim was to analyse the impact of *HspB1* invalidation on the proteomic profile of the m. *Tibialis anterior*.



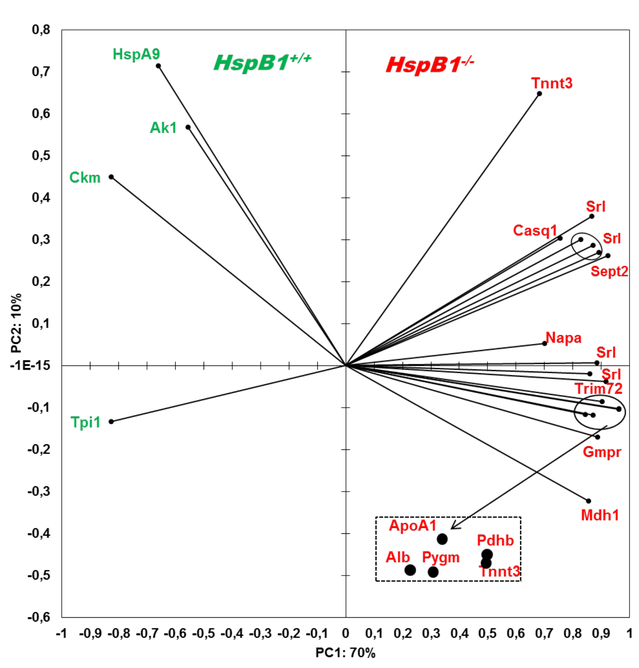
N=5 mice per group (Ko vs controls)
12 weeks postnatal
2DE (pH range 5-8)
Mass Spectrometry LC-MS/MS
Thermo Proteome Discoverer v1.2
Mascot analysis

464 protein spots

RESULTS

HspB1-null mouse

Differential proteins



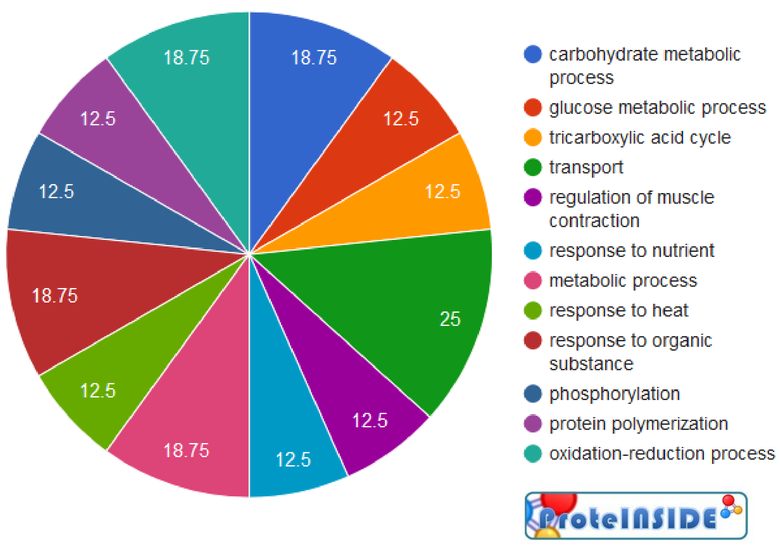
35 spots with significant differences
16 proteins with different Uniprot ID
18 up- and 4 down-regulated spots
6 isoforms of sarcalumenin

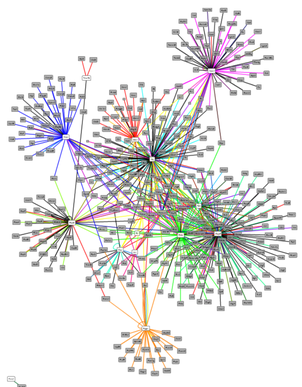
Validation (Western-blot)

	HspB1-null	WT	SEM	Signification
Pygm	61072	64897	4897	NS
Casq1	107586	103184	5015	NS
HspA9	20946	40914	3583	**
HspA8	233744	404037	32292	**
Park7	328440	383780	17540	*
Mdh1	93353	161232	23589	t
Srl	18690	17144	489	t
Alb	955617	975046	20705	NS
Ar	611888	1001119	75910	**

Protein functions

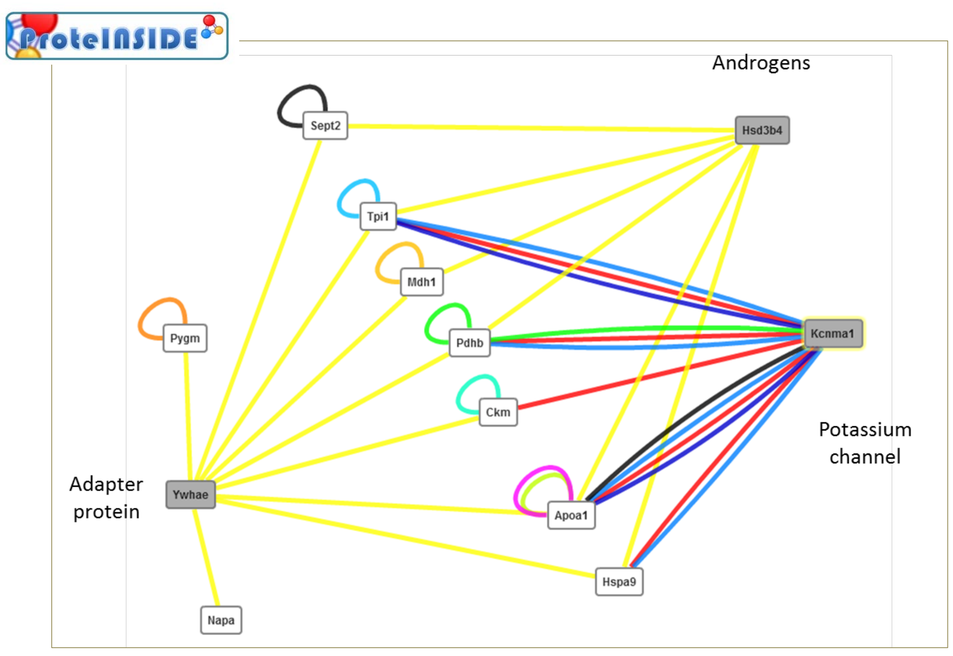
Percentage of annotation frequency by GO on the ontology group (%)





Molecular networks

603 interactions (PPI) detected outside the dataset for 415 proteins including 14 of the differential proteins



3 proteins highly connected to 9 differential proteins based on curated experimental interactions

CONCLUSION

The invalidation of HspB1 was associated to changes in proteins involved in muscle energy metabolism, calcium metabolism, apoptosis and Hsp status. The information gained by this study will be helpful to predict the side-effect consequences of Hsp27 depletion in muscle development and in cancer or inflammatory pathologies linked to sHsps.

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