

Use of proteomics-related bioinformatics resources

Daniela Quijano

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The goal of this exploration is to become more familiar on protein databases by conducting an exploration on MMP1. **Matrix metalloprotease 1 (MMP1)** is a human protein involved in a number of different diseases, especially cancer. It degrades collagen and other highly insoluble substrates and is therefore crucial for the integrity and flexibility of tissues.

1. What is the gene symbol and the uniprot id for human MMP1? MMP1 is also found in other organisms. When we select for 'human' in UniProt, we see the ID is *P03956*. The gene symbol is MMP1 and CLG is a synonym. The secondary Accession is *P08156*

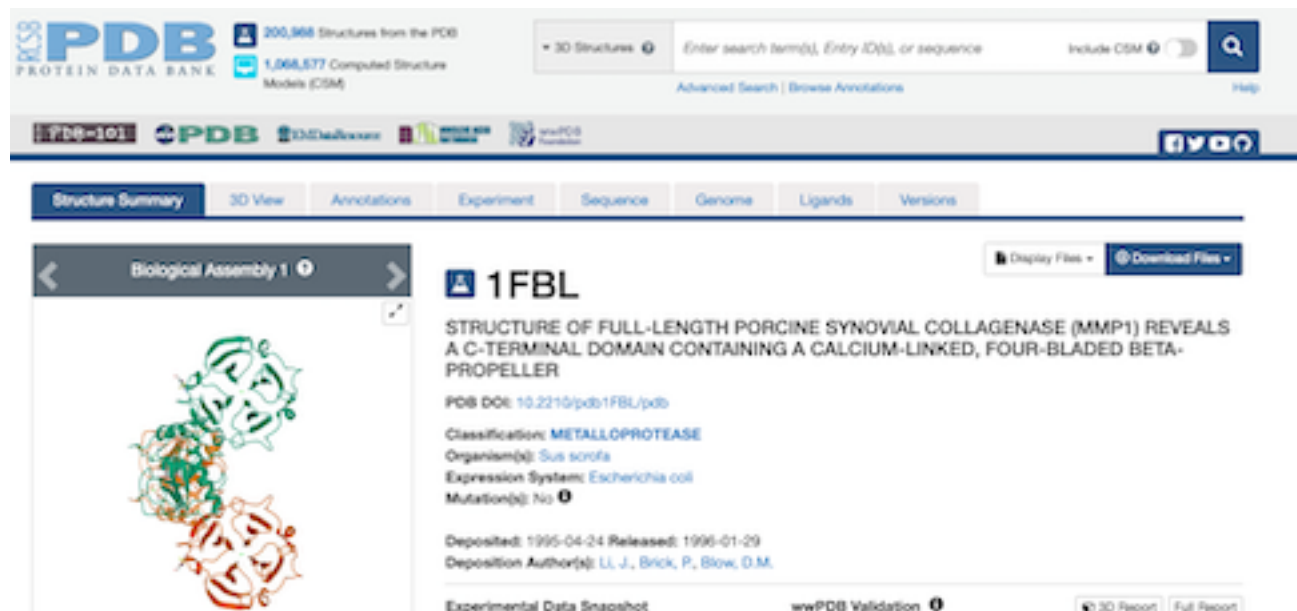


Figure 1: MMP1 Uniprot

Source: <https://www.uniprot.org/uniprotkb/P03956/entry>

2. What is the pdb code for its structure? Copy and paste an image of its structure here8

The PDB code for its structure is 1FBL



Source: <https://www.rcsb.org/structure/1FBL>

3. Is MMP1 phosphorylated? If yes, where (at what position) and at what amino acids?

According to phosphosite.org-a database for post translational modifications- there are 10 phosphorylated sites found by high throughput papers and only one was found by both high throughput and low throughput papers. See below for the exact sites that are phosphorylated. There is interestingly, one ubiquitylation listed in residue 450.

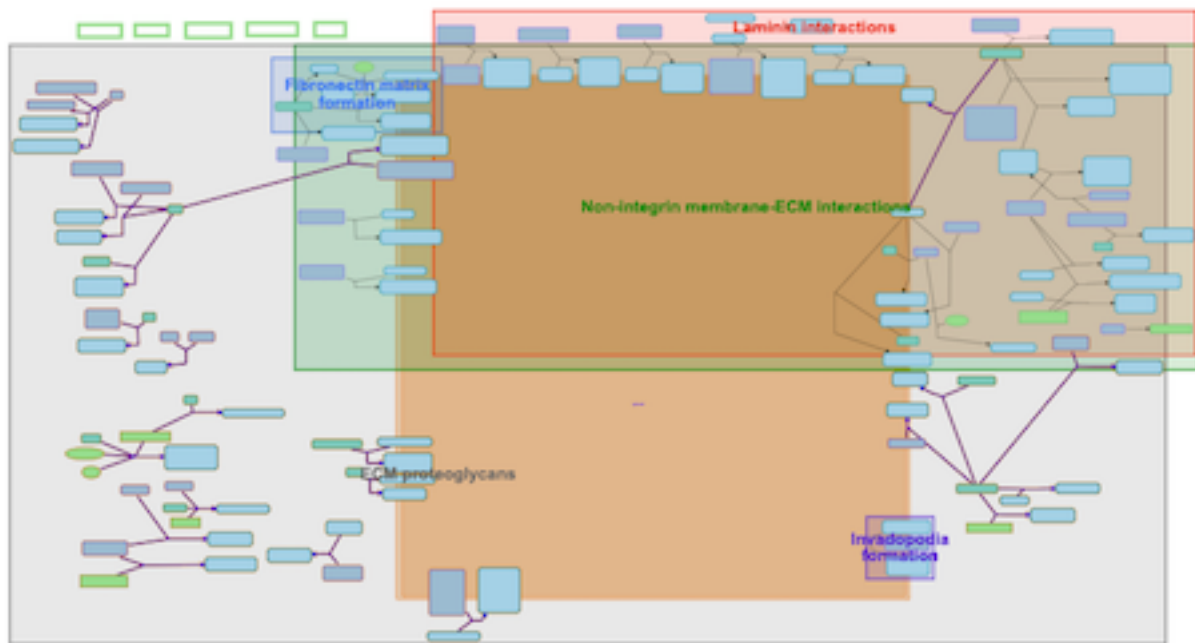
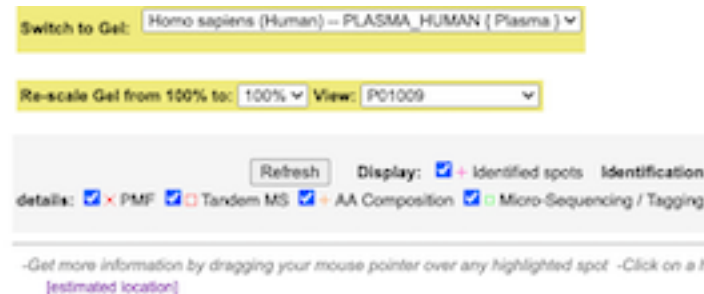


Figure 4: MMP1 pathways

6. Was MMP1 found in any 2d gel, if yes, provide the image of the gel (or if there are two or more different conditions compared in one study, discuss similarities and differences for different gems with respect to MMP1.

I had a slightly difficult time using the gels database because it kept returning no queries. When searching the SWISS-2DPAGE Repository, with the term Matrix metalloprotease, 13 results show-7 results correspond to humans. One study compares the expression in different conditions like cirrhosis or pregnancy (see gel below). The gel unfortunately does not annotate MMP1.



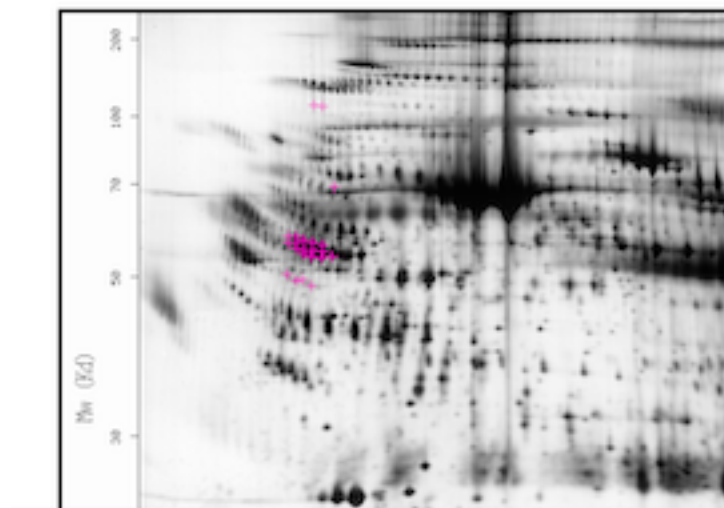
Remote Interface "SWISS-2DPAGE"

Searching in SWISS-2DPAGE for entries matching any of the keywords:
Matrix metalloprotease

In full description (24), entry name (25), gene name (26) or UniProtKB Swiss-Prot accession (28).

Query Result: 13 matches

Accession number	ID	Description	Gene	Keywords	Species
P01009	MTMP_HUMAN	ProName: Fubulalpha-1 antigen; AffName: Fubulalpha-1 protease inhibitor; AffName: Fubulalpha-1 antiprotease; AffName: Fubulserpin A1; Contains: ReName: Fubulserpin peptide from AAT; ShortName: Fubulserpin; Precursor.	(Name=SERPINA1; Synonyms=MT, PI; ORFName=PRO088, PRO088)	3D structure; Acute phase; Alternative splicing; Blood coagulation; Complete proteome; Direct protein sequencing; Extracellular matrix; Glycoprotein; Polymorphism; Protease inhibitor; Reference proteome; Secreted; Serine protease inhibitor; Signal	Homo sapiens (Human)
		ReName: Fubulserpin A2; AffName: Fubulserpin 2; AffName: Fubulserpin 2;		Acetylation; Anionics; Basement membrane; Polypeptide	



Source: https://world-2dpage.expasy.org/swiss-2dpage/viewer&map=PLASMA_HUMAN&ac=P01009

7. What is MMP1's mass? Have peptides derived from MMPP1 been found in any samples? Show the corresponding mass spectra

The mass of MMP1 is 1751.92 (average molecular weight). According to the peptide atlas, there are 115 derived pep-

Spectrum for [iTRAQ4plex]-AFQLWSN[Deamidated]VTPLTFTK[iTRAQ4plex]⁺²

