

DR. JAY E. SLATER (Orcid ID : 0000-0001-7168-4276)

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Diversity and complexity of mouse allergens in urine, house dust, and allergen extracts assessed with an immuno-allergomic approach

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Samuel T. Mindaye*, Carl Sun*, Sayyed Amin Zarkesh Esfahani*, Elizabeth C. Matsui**, Michael J. Sheehan***, Ronald L. Rabin*, Jay E. Slater*

Laboratory of Immunobiochemistry, Division of Bacterial, Parasitic, and Allergenic Products, Food and Drug Administration, Silver Spring, MD; **Department of Population Health and Pediatrics, Dell Medical School, The University of Texas at Austin, Austin, TX; *** Department of Neurobiology and Behavior, Cornell University, Ithaca, NY

Corresponding author: Jay E. Slater, MD

US Food and Drug Administration

10903 New Hampshire Avenue

Silver Spring, MD 20993

Jay.Slater@fda.hhs.gov

240.402.7396

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Abstract

Background: Mouse allergy is an important cause of indoor asthma and allergic rhinoconjunctivitis. The major mouse allergen, Mus m 1, is a complex of homologous pheromone-binding lipocalins called major urinary proteins (MUPs).

Methods: We analyzed the proteome of MUPs in mouse urine, commercial mouse epithelial extracts, and environmental samples using several approaches. These include: two-dimensional electrophoresis and immunoblotting; liquid chromatography-high resolution mass spectrometry (LC/HRMS); multiple reaction monitoring (MRM) mass spectrometry; and LC/HRMS analysis of glycans at the N-66 residue of MUP3.

Results: Albumin is predominant in the extracts while MUPs predominate in urine. LC/HRMS of 4 mouse allergen extracts revealed surprising heterogeneity. Of 22 known mouse MUPs, only 6 (MUP3, MUP4, MUP5, MUP13, MUP20 and MUP21) could be identified with MRM using unique peptides. Assessment of MUP content in urine, extracts, and dust samples showed good correlation between MRM and other methods working with different detection principles. All 6 identifiable MUPs were found in electrophoretically separated urine bands, but only MUP3 and MUP20 were above LOQ in unseparated mouse urine, and only MUP3, MUP4 and MUP20 were found in mouse epithelial extracts. Glycan heterogeneity was noted among 4 individual inbred mice: of 12 glycan structures detected, 7 were unique to one mouse, and only 2 glycan modifications were present in all 4 mice.

Conclusions: Using mass spectrometry and MRM, mouse allergen extracts and urine samples are shown to be complex and heterogeneous. The efficacy and safety of commercial mouse allergen extracts will be improved with better controls of allergen content.

Introduction

Mouse allergy is an important precipitant of asthma and rhinoconjunctivitis. Mouse infestations are ubiquitous and eradication is challenging. A randomized trial of mouse allergen reduction¹ failed to show either allergen reduction or clinical benefit with intensive rodent eradication as compared with education about pest management. However, those individuals in homes that experienced reductions in mouse allergen levels experienced clinical improvement. For some laboratory workers and veterinarians rodent allergy can be a career-altering condition².

Mouse allergens have been identified in skin, serum and urine, with major allergen activity detected in serum and urine³. A 67 kDa putative allergen predominant in serum is albumin, and a 17-20 kDa allergen in serum and urine has been identified as Mus m 1. Initially considered a single protein, Mus m 1 is a complex of homologous pheromone-binding lipocalins, synthesized in the liver, called major urinary proteins (MUPs)^{4,5}. MUPs are expressed more in males than females, and more in adults than juveniles⁶. Mature MUPs are around 162 amino acids long and share a hydrophobic β -barrel that binds volatile small molecules for slow release, which facilitates their function as pheromones⁷. Sixteen murine MUPs (1,2,7,8,9,10,11,12,13,14,15,16,17,18, 19, and 22[†]) have >97% sequence homology and have been designated as “central”, while six MUPs (3,4,5,6,20, and 21) are called “peripheral” and have 67-90% sequence homology^{8,9} (Table 1, top). Murine MUPs have been mapped to genes on chromosome 4⁹. Using sera of laboratory animal workers and preschool inner-city children, native Mus m 1, mouse urine and recombinant MUPs, investigators determined that cross-reactivity was greatest between MUP8 and Mus m 1, although partial evaluations confirmed immunologic cross-reactivity among other MUPs as well¹⁰. In allergen databases (allergen.org; allergome.org), only two variants are designated, Mus m 1.0101 (MUP6) and Mus m 1.0102 (MUP2).

Mouse allergen extracts have been used for the diagnosis and treatment of mouse allergy for decades^{11,12}. Like other non-standardized allergen extracts in the United States, mouse allergen extracts are not controlled for potency or allergen content¹³; they are labelled by w/v and PNU/mL, which are unrelated to biological potency. Prepared from mouse hair and skins, these products are not specifically enriched for urinary protein allergens. However, at least one group¹⁴ found that the skin test performance characteristics of a customized mouse urine extract were no better

[†] MUP 22 is a predicted sequence that has not been identified as yet.

than a commercial mouse epithelial extract, even though the diagnosis was confirmed with nasal challenge using the mouse urine extract.

These extracts are used extensively for the diagnosis and treatment of mouse allergy and are increasingly important in clinical practice and clinical investigation. Yet little information is available regarding MUP concentrations and ratios at manufacture and over the product's shelf life, which may be as much as 6 years at 4-8°C¹³. Characterization of currently available mouse allergen extracts, as well as investigational alternative diagnostics and therapeutics for mouse allergy, is needed.

Studies of MUP liver transcriptomes¹⁵ and urinary MUPs¹⁶ from wild mice have identified significantly greater MUP heterogeneity than seen in inbred strains. Because of regulatory requirements in the United States[‡] and Europe[§], commercial mouse epithelial allergen extracts are likely derived from the pelts and dander of laboratory mouse strains. Thus, we expect these extracts to be most useful for the diagnosis and treatment of laboratory and veterinary workers, but they may underperform when applied to individuals reactive to domestic mouse infestations.

The specific allergen content of allergen extracts can often be determined by immunoassay, and multiplex immunoassays can be used to characterize some complex allergen extracts. We have applied such multiplex immunoassays to potency determinations for short ragweed pollen, cat¹⁷, and German cockroach allergen extracts¹⁸, but highly complex multi-allergen extracts, such as German cockroach, posed challenges that led us to seek better approaches. We have recently developed a robust mass spectrometry-based approach to the characterization of complex allergen extracts and have successfully implemented this approach with German cockroach allergen extracts^{19,20}. In this paper we apply this approach to the measurement of allergens in mouse urine, commercial mouse extracts, and environmental samples.

[‡] 21 CFR 680.1(b)(3)

[§] Guideline on allergen products: production and quality issues, EMEA/CHMP/BWP/304831/2007.

Materials and methods

Materials: Mouse epithelial allergen extracts (in 50% glycerin) were purchased from ALK-Abelló (1:20; Port Washington, NY), Allergmed Laboratories (1:10; San Diego, CA), Stallergenes-Greer (1:10 or 1:20; Lenoir, NC), and Allergy Laboratories (1:50; Oklahoma City, OK). Mouse urine collected from three male (S1-S3) and two female (S4-S5) C57BL/6 mice was acquired from BioIVT (Westbury, NY). Urine from wild mice collected in upstate New York was pipetted upon evacuation repeatedly from individual mice placed in clean cages, and kept frozen at -80°C until shipment to Maryland on dry ice²¹. For analysis of environmental samples, settled dust was collected from homes of children with asthma in Baltimore using Mitest dust collectors (Indoor Biotechnologies), sieved and stored at -30°C until extraction²². The dust collection was approved by the Johns Hopkins Medical Institutes Institutional Review Board and study participants provided written consent. Recombinant MUP proteins were purchased from Aviva Systems Biology (MUP 20), MyBioSource (MUP2, MUP6, MUP11/8) and Biorbyt (MUP1, MUP2, MUP6, MUP8, MUP20). Sequencing grade trypsin was obtained from Promega. Reference peptides were chemically synthesized in isotopically labelled forms by Thermo Fisher Scientific. Solvents were LC-MS grade and were purchased from Fisher Scientific. Reagents for defatting and extraction were obtained from Sigma.

Two dimensional SDS-PAGE separation of MUPs with immunostaining detection:

First-dimension isoelectric separation was performed using pH 3-6 Strip (Serva), with a 3-step gradient of 175V for 15 min, 175-2000V over 45 min (linear gradient), and 2000V for 105 minutes. Second-dimension separation was achieved using a 12% bis-tris 1 mm SDS gelrun at 130V for 90 min. Immuno-reactive gel spots were revealed with rabbit anti-Mus m 1 polyclonal antibody (1/20,000 dilution) and patient plasma from mouse-sensitive individuals (Plasma Labs) (1/20 dilution). Reactive spots were excised, de-stained, reduced, alkylated, digested with trypsin and analyzed by high-resolution MS.

Multiple reaction monitoring (MRM) method development:

From the published MUP sequences, we selected unique peptides representing individual MUPs, based on sequence uniqueness, ionizability and suitability for chromatography. Owing to the high degree of similarity between MUPs, we were able to identify representative tryptic peptides for only six of the 21 MUPs: MUP3, MUP4, MUP5, MUP13, MUP20, and MUP21 (Table 1,

bottom). Isotopically tagged peptides, chemically synthesized with C-13 and N-15 substituted N-terminal residues (R or K), were employed for optimization of fragmentation parameters and chromatographic separation conditions^{19,20}.

Performance evaluation of the MRM method:

We evaluated MRM for precision and linearity by repeated analyses of reference peptides spiked at various concentrations in digests prepared from equimolar mouse urine proteins solutions. Linearity was established for concentration range of 1-1000 fmol/ μ L with $R^2 \geq 0.97$; hence the lower limit of quantification (LOQ) for this assay is 1 fmol/ μ L. Accuracy was estimated by comparing MUP concentrations in various matrices measured using MRM against methods working with different detection principles: ELISA for MUP constituents in urine samples or commercial epithelial extracts, and SDS-PAGE estimation for recombinant MUPs.

MRM was also evaluated for its ability to detect and quantify MUPs in different matrices: environmental samples, commercial extracts and urine. For analysis of environmental samples, settled dust was extracted overnight at 4°C, 1:20, w/v, in PBS with 0.1% Tween20. After centrifugation, the supernatant was sterile-filtered (0.2 μ m) and stored at -30°C. For MRM analysis, PBS was exchanged for 50 mM ABC by 3kDa MWCO filtration. Samples were subjected to overnight trypsinization (ratio 1:1); the digestion was stopped by acidification and dried. Digests were reconstituted in 0.1% formic acid; the appropriate reference peptide cocktail was added, and LC/MRM MS analysis was performed.

Proteomic mapping using liquid chromatography-high resolution mass spectrometry (LC/HRMS):

MUP-containing samples were reduced, alkylated, quenched, digested and reconstituted. Digests (1-2 μ g total protein) were separated on the UltiMate 3000RSLC nano system equipped with nano pump NCS-3000 and autosampler WPS-3000TPL (Thermo Scientific Dionex). The EASY-Spray analytical column was connected to the LC system with a Thermo Scientific™ Dionex™ nanoViper™ finger tight fitting. Peptide MS/MS analysis was performed with an Orbitrap Fusion Lumos Mass Spectrometer. Raw data was processed using Bionics software version 2.1.0.80 and MS/MS spectra were searched against in-house MUPs database assembled from consensus coding sequence of NCBI. All reaction conditions, settings, and search rules were as previously reported¹⁹.

Heatmap generation:

For relative protein abundance determination, the total intensities of all protein-matched peptides (total ion intensity) were normalized against the total ion intensity of a reference protein (bovine catalase spiked at 800 fmol per injection). For heatmap visualization, the normalized total ion intensity of a protein in extracts processed side by side were imported into an on-line web tool (Heatmapper, <http://www.heatmapper.ca/expression/>). A heatmap was generated using settings of "Average Linkage" for clustering and "Spearman Rank Correlation" for distance measurement between clusters..

Glycosylation pattern mapping using LC/HRMS:

Urine proteins were separated by SDS-PAGE and spots corresponding to suspected glycosylated proteins (apparent molecular weights greater than expected for the protein alone, 22-25 kDa) were lifted for in-gel digestion. Glycopeptide enrichment was performed using ProteoExtract Glycopeptide Enrichment Kit (Novagen). For each enrichment batch, 10 μ L of digest were processed following the manufacturer protocol. Three separate enrichment batches were pooled together and analyzed by LC/HRMS. The mass spectrometry parameters for acquisition of the data is described previously¹⁹.

The following settings were used for glycopeptide sequencing: scan from 350–2000 m/z , at resolution 120000 (m/z) with a 4e5 AGC target value, and ion funnel RF of 30. Multiply charged positive ions (2-8) with intensity at least 5e4 and dynamic exclusion set to 60s were selected for data-dependent MS/MS acquisition (HCD mode). The HCD fragmentation was run at 28% collision energy, resolution at 15000, isolation window of 1.2 m/z , first mass of 120, and AGC target of 5e4. An additional trigger involved detection of glycan oxonium ions (m/z 138.0545, 204.0867, and 366.1396) in the HCD MS2 spectra within 15 ppm mass tolerance that triggers subsequent electron-transfer/higher-energy collision dissociation (ET_hCD) MS2 acquisition.

Impacts of glycosylation on antibody binding:

The antibody-binding profile of the native and deglycosylated MUPs were compared by ELISA using anti-Mus m 1 polyclonal rabbit antiserum following the manufacturer's protocol (Indoor Biotechnologies, catalogue number EPC-MM1). For this, urine samples of inbred mice were split into three aliquots. One portion was deglycosylated using PNGaseF and the second portion was left untreated. The third portion was subjected to digestion conditions in the absence of PNGaseF, and served as the true negative control.

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Results

We examined the protein and allergen content of mouse allergen extracts, mouse urine, and environmental samples, using protein electrophoresis, immunoblotting, mass spectrometry, and MRM.

Proteomic evaluation of mouse urine and mouse epithelial allergen extracts

Mouse urine is protein-rich, and concentration is hard to assess because of small volume and rapid evaporation. In our five samples collected from individual C57BL mice, protein content ranged from 1.5 to 9.3mg/mL, with samples from male mice nominally more protein-rich (2.1-9.3mg/mL compared to 1.5-1.9mg/mL for females). On conventional SDS-PAGE there was some heterogeneity with prominent bands that migrated with an apparent molecular mass of 20 kDa (lanes S1-S5 in Figure 1A). To further resolve immunoreactive mouse urine proteins, samples were separated by 2-dimensional SDS-PAGE followed by immuno-probing using rabbit polyclonal anti-Mus m 1. Immunoreactive spots were mapped onto Coomassie stained gel (Figure 1B).

Over 20 discrete spots were identified of apparent molecular mass 15-25 kDa in the pH 3-7 range, with at least six spots identified at higher apparent masses. The presence of MUPs in these immunoreactive spots was confirmed by picking individual spots and analyzing them using LC/HRMS in a bottom-up approach.

To investigate molecular heterogeneity among mouse epithelial allergen extracts, we performed proteomic mapping using LC/HRMS on four commercial products. We generated a heatmap (Figure 2A) with a label-free approach using normalized spectral count of non-redundant proteins identified from each extract. A total of 573 frequently identified proteins were considered in the heatmap generation (SupplementaryTable 1); we observed substantial proteomic heterogeneity among the four extracts. Furthermore, the protein profile of mouse urine is remarkably different from epithelial extracts both in electrophoretic profile (Figure 1A) and LC/HRMS mapping. For example, non-MUP proteins in epithelial extracts account for >90% of the mass while non-MUP proteins in urine samples account <15% of the proteomic mass (Figure 1A). This, together with LC/HRMS (not shown) show that albumin is the major protein in epithelial extracts whereas MUP is dominant in urine.

Using LC/MRM, we¹⁹ and others have been able to identify and quantify allergen isotypes with single-amino acid differences. However, identifying specific proteins by MRM requires the selection of proteotypic peptides that not only contain those sequence variations, but that also fulfill other

technical requirements, including good ionization efficiency, optimal length and m/z ratio, no missed cleavages, and resistance to non-specific modifications²³. Optimal accuracy of quantification can be achieved if several prototypic peptides can be identified for each target protein. Because of high degree of sequence homology, most MUPs do not have unique strings of tryptic peptides to distinguish them from others. Thus, unique peptides were only identifiable for 6 MUPs (MUP3, MUP4, MUP5, MUP13, MUP20 and MUP21) (Table 1, bottom) and only these MUPs can be quantified specifically.

For determination of total MUP content, we noted that the peptide EPDLSSDIK is shared by all the central MUPs and MUP5, MUP20, and MUP22. Therefore, total MUP content can be determined by the following formula:

$$\text{MUP (total)} = \Sigma (\text{MUPs measured with EPDLSSDIK}) + \Sigma (\text{MUP3, MUP 4, MUP 21})$$

Using the MRM method in different matrices

Known quantities of recombinant MUPs (MUP1, MUP2, MUP6, MUP8, and MUP11) were subjected to MRM analysis. Since the available MUPs were not the ones with unique peptides (Table 1, bottom), their quantities were estimated using the signal from the shared peptide EPDLSSDIK. The results correlated well with the labeled quantities confirming suitability of the MRM parameters established for the shared peptide EPDLSSDIK (Figure 3A).

MRM analysis of laboratory mouse urine confirmed the presence of MUP3, MUP4, MUP5, MUP13, MUP20 and MUP21 in at least some of the bands and spots in Figure 1 (data not shown). MRM analyses were performed on urine from 4 C57BL mice (2 male, 2 female) and from 12 wild mice (11 male, 1 female) (Figure 4, top).

As expected there was considerable intersubject variability in total MUP level, among both inbred and wild mice (492 ± 140 fmol/ μ L and 393 ± 143 , respectively). Among the inbred mice female MUP content was lower than males (371 ± 16 fmol/ μ L compared to 611 ± 12 in males) although the MUP content of the sole female wild mouse (278 fmol/ μ L) was within the 95%CI of the values for the 11 male wild mice (403 ± 146). We also measured MUP3 and MUP20 in mouse urine samples (Figure 4, bottom). Among the urine samples from the male wild mice, MUP3 and MUP20 content were much higher than in the sole female wild mouse sample (MUP3: 22.6 ± 7.9 compared to 5.5; MUP20:

31.3±21.0 compared to 4.1). Among the inbred mice, males have more MUP20 than female mice (46.3±17.0 compared to 3.8±0.3). For MUP3, high variance between the two urine samples from inbred female mice makes direct comparisons uncertain. MUP4, MUP5, MUP13 and MUP21 were at or below the LOQ (1 fmol/μL) in the urine samples available. The total MUP content of inbred mouse urines by ELISA for Mus m 1 showed good correlation between MRM-based quantifications and ELISA (Figure 3B).

As expected from our heatmap analysis (Figure 2A), the total and specific MUP content of commercial mouse epithelial allergen extracts vary (Figure 2, panels B and C), although only 3 of the 6 distinguishable MUPs (MUP3, MUP4 and MUP20) are present in measurable amounts. Independent testing of the total MUP content against commercial ELISA for Mus m 1 showed a good correlation (Figure 3C). Notably, the epithelial extracts had consistently lower MUP content than the urines we examined (Supplementary Figure 1).

Finally, we evaluated the MUP content of environmental samples collected from the homes of patients with asthma in the Baltimore area²⁴. The peripheral MUPs, and MUP13, were below LOQ. Total MUP content was determined on extracts prepared from samples collected from 6 beds (range 1.6-84.2 ng/mL), 9 bedroom floors (2.5-497) and 9 kitchen floors (1.5-514.4) (Supplementary Figure 2). Testing for Mus m 1 content by ELISA confirmed, again, good correlation with total MUP values (Figure 3D).

Post-translational modification of MUPs

Some of the IgE-reactive spots in two dimensional separated samples (Figure 1B) were identified at higher apparent molecular masses than expected. These variants had different isoelectric points as well and were detected in urine samples from both C57BL mice and wild mice (not shown). To test the hypothesis that these high molecular weight species were glycan-modified MUPs, two urine samples were subject to PNGase deglycosylation and analyzed by SDS-PAGE and IgE-binding ELISA. The high molecular weight species disappear following deglycosylation (not shown), which had no effect on binding to Mus m 1-specific binding to rabbit polyclonal IgG (Figure 5C).

To further characterize the glycan modifications, urine samples from four C57BL mice were separated by SDS-PAGE and the higher molecular weight species were selected for in-gel trypsin digestion. Glycan-modified peptides were enriched and analyzed using LC-HRMS. Search of MS/MS spectra in a database containing all MUP sequences with potential glycan-modifiable residues

revealed that all modified peptides were derived from MUP3 by variable glycan modification of the N-66 residue.

We profiled glycosylation patterns of native MUP3 using LC/HRMS (Figure 5A). Glycan heterogeneity among individual C57BLmale (S1-S3) and female (S4) mice are shown in Figure 5B. The identities of individual modifications are summarized in SupplementaryTable 2. Of the 12 glycan structures detected, 7 were unique to one mouse in the group, and only 2 glycan modifications (HexNAc(5)Hex(6)NeuGc(3) and HexNAc(4)Hex(5)NeuGc(2)) were present in all 4 mice. Deglycosylation of mouse urine had no effect on the binding of a rabbit polyclonal anti-Mus m 1 antibody (Figure 5C).

Discussion

MRM²³ should be an ideal technique to apply to the measurement of Mus m 1 variants. By selecting the appropriate peptide probes, subtle differences in primary structure can be distinguished readily. Therefore, we were disappointed that only 6 of the 22 known MUPs (MUP3, MUP4, MUP5, MUP13, MUP20, and MUP21) could be identified using MRM. Due to their extremely close sequence similarities, only one of the “central” MUP (MUP13) could be measured; the remaining 5 measurable MUPs are all “peripheral”. One of our future plans is to use different enzyme rules to create longer stretches of peptides to increase the likelihood of unique peptide probes for a greater number of MUPs.

Even with these limitations, our use of MRM and LC-HRMS to measure MUPs in mouse urine, allergen extracts, and environmental dust provided valuable observations, only some of which confirmed prior reports. For example, the excess of MUPs in urine over extracts (Supplementary Figure 1) is consistent with previous observations²⁵ as is the presence of a greater MUP concentration in urine from male mice (Figure 4)^{26,27}.

We were surprised by the heterogeneity of mouse commercial extracts (Figure 2) although large differences in Mus m 1 content have been previously reported²⁸. In previous work¹⁹ we attributed German cockroach allergen extract heterogeneity entirely to source material variations, but the source materials for mouse extracts (laboratory strain mouse pelts) are presumably uniform from manufacturer to manufacturer. It is possible that mouse extract variations are due to different extraction protocols, but our previous work suggests that such changes should have minimal impact on product composition.

We observed that, among the 6 identifiable MUPs, only MUP3 and MUP20 were detectable in urine. This is consistent with previous experience: MUP4, MUP5, and MUP21 have not been previously reported in mouse urine and, while MUP13 (or a protein with a similar mass) has been detected in urine of wild mice, it is not seen in C57BL urine^{21,29}. The presence of MUP4 in extracts but not urine may be attributable to the preferential expression of MUP4 in lachrymal, parotid and sublingual glands^{9,30}.

Previous investigators have identified MUPs as the most prevalent peptides associated with T-cell responsiveness in mouse-allergic and mouse-exposed individuals^{31,32}, although – consistent with

others' observations regarding the utility of mouse epithelial allergen extracts¹⁴ - non-urinary peptides can elicit T-cell responses as well. Our methodology provides a rapid and accurate assessment of the MUP content of mouse allergen extracts, murine source materials, and environmental dusts that will facilitate studies going forward. It also permits us to characterize in detail post-translational modifications that can affect antibody binding and T-cell reactivity.

Allergen extract characterization can improve our understanding of the underlying pathobiology of allergic disease and can lead to improved diagnostics and immunotherapeutics. Although other mouse allergens, such as albumin³, have been proposed, Mus m 1 remains the major pathogenic allergen^{3,26}. The consistent observation that Mus m 1 has numerous variants indicates that the full description of this important allergy is considerably more complex than previously understood. Recently, others have clarified epitope and T-cell specificities in responses to mouse urine allergens³¹⁻³³.

Mouse allergen extracts licensed in the United States are non-standardized, and no controls are in place for specific allergen content. Nonetheless, they appear to be useful in the diagnosis¹⁴ and treatment^{11,34,35} of mouse allergy. Our ability to assess specific allergen content across several matrices will enable us to answer additional questions of both scientific and regulatory interest:

- Once excreted, how stable are different MUPs in domestic house dust?
- What causes mouse epithelial allergen extract heterogeneity, and what are the implications of this heterogeneity for product quality?
- Can one correlate the diagnostic and therapeutic efficacy of different mouse extracts with their allergen profiles?
- Will allergic individuals reacting to wild mice and inbred mice benefit from the use of allergen extracts with different specificities?
- Do post-translational modifications of MUPs affect the diagnostic or therapeutic performance of mouse allergen extracts?

Table 1

MUP#	AA length	#tryptic peptides	# unique peptides	MUP#	AA length	#tryptic peptides	# unique peptides
MUP1	180	12	0	MUP12	180	12	0
MUP2	180	12	0	MUP13	180	12	1
MUP3	184	11	3	MUP14	180	13	0
MUP4	178	12	9	MUP15	180	12	0
MUP5	180	11	8	MUP16	180	12	0
MUP6	179	11	8	MUP17	180	12	0
MUP7	180	12	0	MUP18	181	12	0
MUP8	180	13	0	MUP19	180	12	0
MUP9	180	12	0	MUP20	181	12	6
MUP10	180	12	0	MUP21	181	11	4
MUP11	181	12	0	MUP22	181	12	0

Prototypic peptides for MRM method development

MUP3	MUP4	MUP5	MUP13	MUP20	MUP21
EPDLSLDIK	ADLNSDIK	IEEHGTMR	YSVTYDGFNTFTIPK	INGEWYTIMLATDK	EPYLSLDIK
AGIYYMNYDGFNTFSILK	GQNLNVEK	LCEEHGIVR		ENIIDLTNANR	
		WFSILLASDK			

Figure 1: SDS-PAGE (A) of mouse epithelial extracts and urines from C57BL mice (S1-S3, male; S4-S5, female); and 2-dimensional electrophoresis (B) of a mouse urine sample. In an immunoblot using rabbit polyclonal anti-Mus m 1 (not shown), immunoreactive spots were identified and mapped onto the Coomassie blue stained gel. AL: Allergy Labs; AM: Allermed; ALK: ALK-Abello; GR: Greer

Figure 2: MUP measurements in commercial allergen extracts. A: Heatmap representation of 573 frequently identified proteins by LC/HRMS in mouse epithelial allergen extracts. GR: Greer; AL: Allergy Labs; ALK: ALK-Abello; AM: Allermed. B: Total MUP detection, using MRM, in mouse epithelial allergen extracts. C: MUP-specific quantification in mouse epithelial allergen extracts. AL: Allergy Labs; AM: Allermed; ALK: ALK-Abello; GR: Greer.

Figure 3: Quantification of MUPs by methods working with different detection principles. Comparison of MRM determinations to (A) SDS-PAGE estimates of individual recombinant MUPs; (B) ELISA estimates of Mus m 1 content in mouse urine samples; (C) ELISA estimates of Mus m 1 content in mouse epithelial extracts; and (D) ELISA estimates of Mus m 1 content in environmental dust extracts.

Figure 4: MRM analyses were performed on urine from 4 C57BL mice (S2-S3, male; S4-S5, female) and from 12 wild mice (11 male, 1 female [number 48]). Estimates for total MUP content were calculated (A) as well as MUP3 and MUP 20 (B)

Figure 5: Glycosylation profile analysis at the N-66 residue of native urinary MUP3 (A) with heterogeneity pattern shown for 4 individual C57BL mice (B). Of the 12 glycan structures detected, 7 were unique to one mouse, and only 2 glycan modifications were present in all 4 mice. In a separate experiment, rabbit anti-Mus m 1 binding to mouse urinary proteins is shown before and after deglycosylation (C).

Supplementary Figure 1: Total MUP content of urine samples from C57BL mice (S1-S3, male; S4-S5, female) compared to commercial mouse epithelial allergen extracts. AL: Allergy Labs; AM: Allermed; ALK: ALK-Abello; GR: Greer.

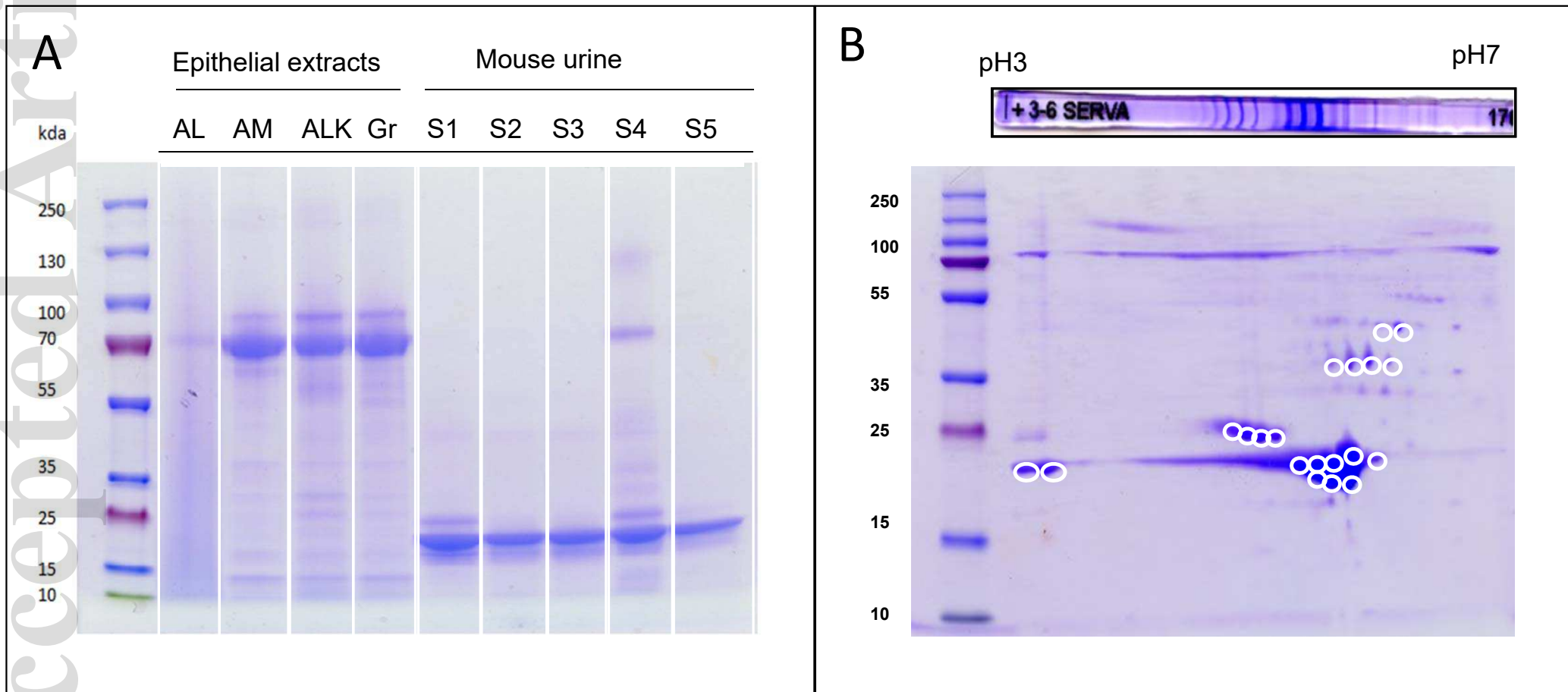
Supplementary Figure 2: Total MUP content of extracted indoor dust samples from Baltimore homes.

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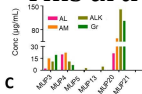
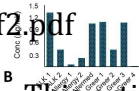
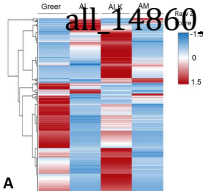
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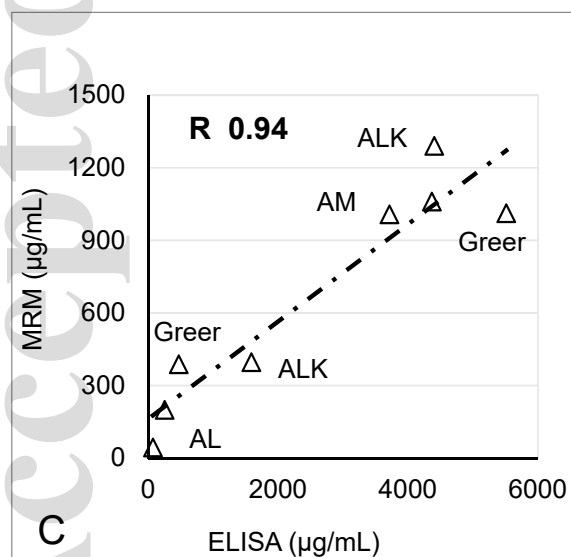
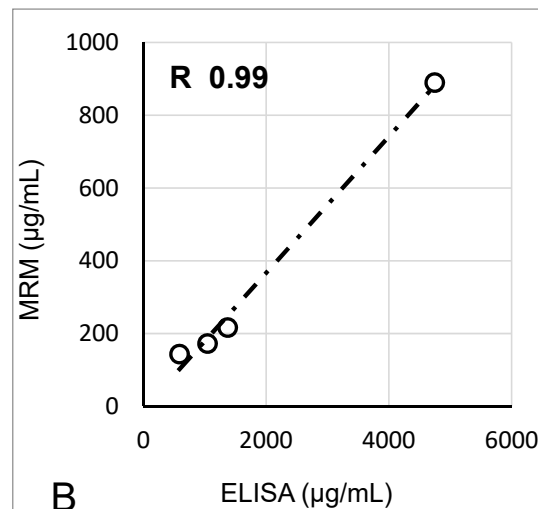
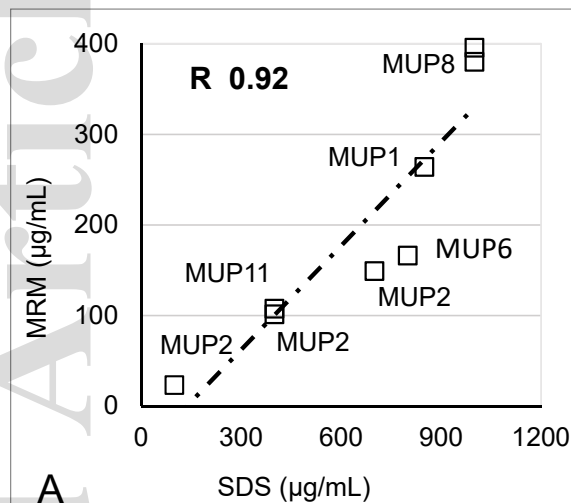
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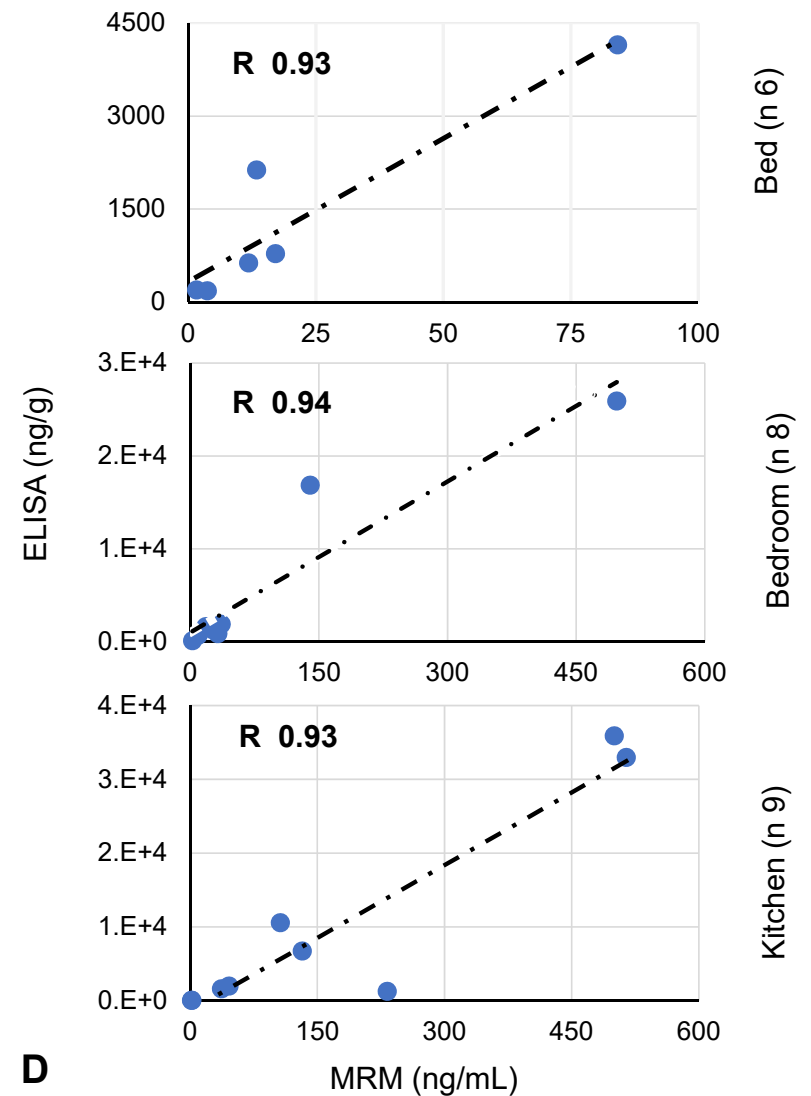


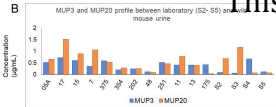
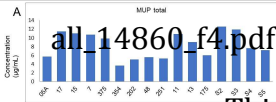
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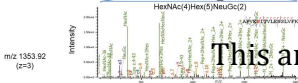
- A: Comparability of MRM against SDS PAGE using recombinant proteins
- B: Comparability of MRM against ELISA using mouse urine samples
- C: Comparability of MRM against ELISA using commercial allergenic extracts
- D: Comparability of MRM against ELISA using environmental dust extracts



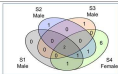


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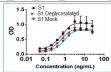
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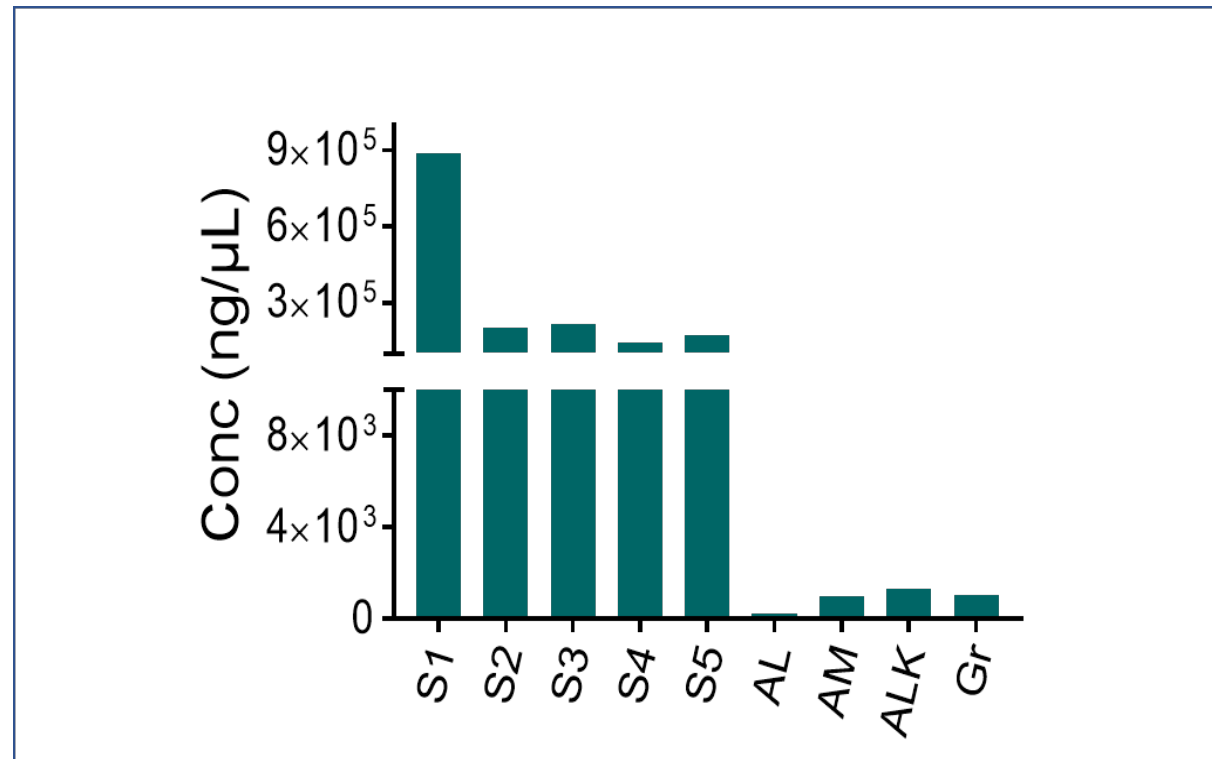
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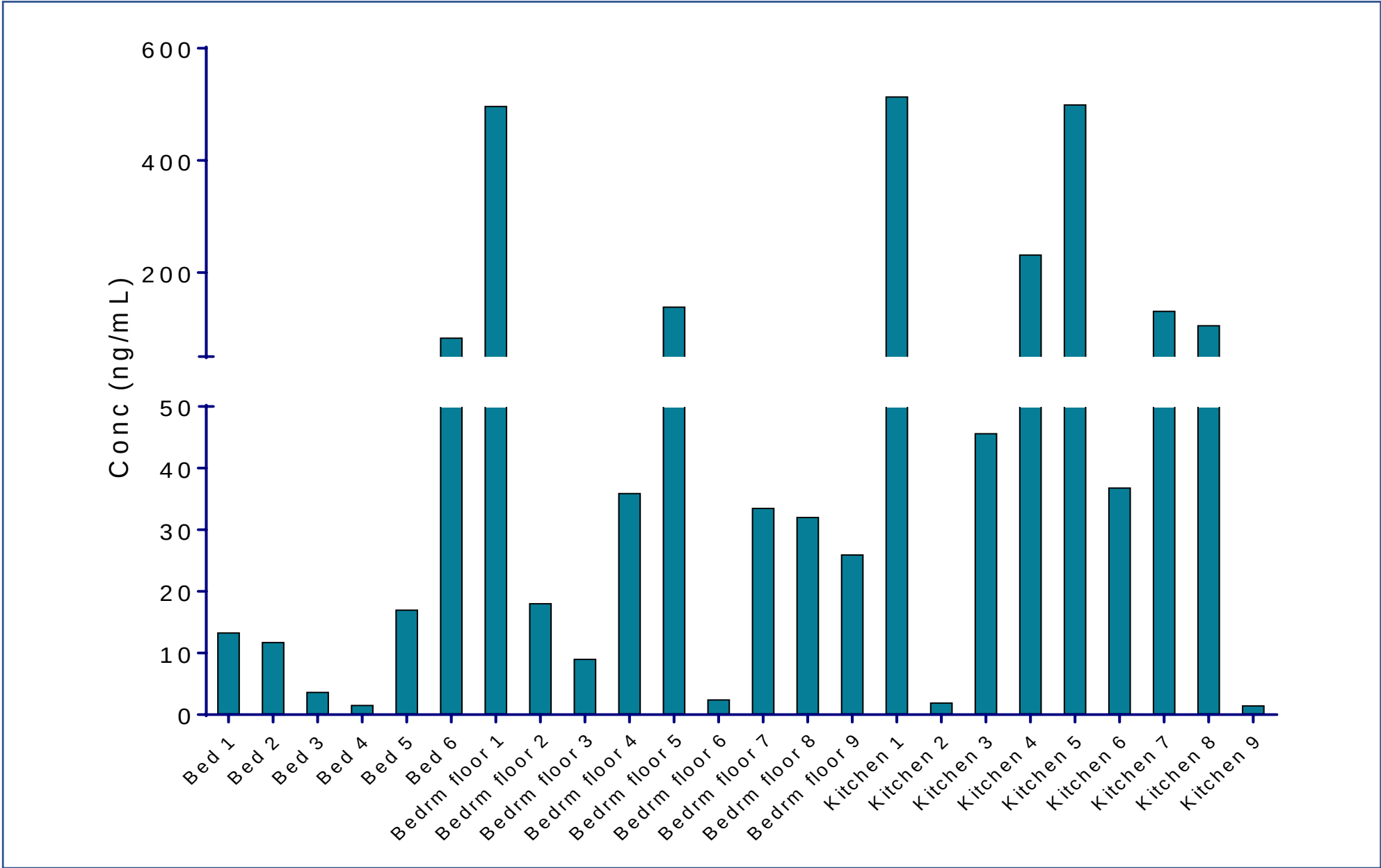
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Supplementary Figure 1: Total MUP content of urine samples from C57BL mice (S1-S3, male; S4-S5, female) compared to commercial mouse epithelial allergen extracts. AL: Allergy Labs; AM: Allermed; ALK: ALK-Abello; GR: Greer.



Supplementary Figure 2: Total MUP content of extracted indoor dust samples from Baltimore homes.



SUPPLEMENTARY TABLE 1

		Normalized total Intensity			
Accession	Description	ALK	AL2	AM	Greer
P62962	>sp P62962 PROF1_MOUSE Profilin-1 OS=Mus musculus OX=10090 GN=Pfn1 PE=1 SV=2	3.612285	0.04377	0.073312	0.270633
P62259	>sp P62259 1433E_MOUSE 14-3-3 protein epsilon OS=Mus musculus OX=10090 GN=Yw	3.426051	0.233285	0.012567	0.328097
P99029	>sp P99029 PRDX5_MOUSE Peroxiredoxin-5, mitochondrial OS=Mus musculus OX=1009	3.311599	0.360739	0.230106	0.097556
P01027	>sp P01027 CO3_MOUSE Complement C3 OS=Mus musculus OX=10090 GN=C3 PE=1 SV	3.271289	0.121255	0.133129	0.474327
P51885	>sp P51885 LUM_MOUSE Lumican OS=Mus musculus OX=10090 GN=Lum PE=1 SV=2	3.237975	0.204658	0.368263	0.189104
Q9WUB3	>sp Q9WUB3 PYGM_MOUSE Glycogen phosphorylase, muscle form OS=Mus musculus C	3.227349	0.146838	0.039443	0.58637
P28665	>sp P28665 MUG1_MOUSE Murinoglobulin-1 OS=Mus musculus OX=10090 GN=Mug1 P	3.227051	0.047866	0.069961	0.655123
Q80UG2	>sp Q80UG2 PLXA4_MOUSE Plexin-A4 OS=Mus musculus OX=10090 GN=Plxna4 PE=1 SV	3.206388	0.222347	0.23964	0.331625
Q61171	>sp Q61171 PRDX2_MOUSE Peroxiredoxin-2 OS=Mus musculus OX=10090 GN=Prdx2 PE	3.203276	0.14462	0.538262	0.113842
P11499	>sp P11499 HS90B_MOUSE Heat shock protein HSP 90-beta OS=Mus musculus OX=1009	3.15159	0.426872	0.060283	0.361256
P11499	>sp P11499 HS90B_MOUSE Heat shock protein HSP 90-beta OS=Mus musculus OX=1009	3.15159	0.426872	0.060283	0.361256
P06151	>sp P06151 LDHA_MOUSE L-lactate dehydrogenase A chain OS=Mus musculus OX=1009	3.149095	0.067446	0.105199	0.67826
P01868	>sp P01868 IGHG1_MOUSE Ig gamma-1 chain C region secreted form OS=Mus musculus	3.119402	0.003971	0.137235	0.739392
P10126	>sp P10126 EF1A1_MOUSE Elongation factor 1-alpha 1 OS=Mus musculus OX=10090 GN	3.064601	0.367707	0.088711	0.47898
P52480	>sp P52480 KP YM_MOUSE Pyruvate kinase PKM OS=Mus musculus OX=10090 GN=Pkm	3.028853	0.150379	0.114282	0.706486
Q61838	>sp Q61838 PZP_MOUSE Pregnancy zone protein OS=Mus musculus OX=10090 GN=Pzp	2.936399	0.101469	0.21732	0.744812
P05064	>sp P05064 ALDOA_MOUSE Fructose-bisphosphate aldolase A OS=Mus musculus OX=100	2.874574	0.117651	0.007775	0
O35887	>sp O35887 CALU_MOUSE Calumenin OS=Mus musculus OX=10090 GN=Calu PE=1 SV=1	2.854039	0.039995	0.105966	0
P02762	>sp P02762 MUP6_MOUSE Major urinary protein 6 OS=Mus musculus OX=10090 GN=M	2.849877	0.083307	0.066816	0
P16045	>sp P16045 LEG1_MOUSE Galectin-1 OS=Mus musculus OX=10090 GN=Lgals1 PE=1 SV=	2.849569	0.192254	0.817113	0.141064
P07310	>sp P07310 KCRM_MOUSE Creatine kinase M-type OS=Mus musculus OX=10090 GN=Ck	2.83217	0.30738	0.761763	0.098688
Q9D1A2	>sp Q9D1A2 CNDP2_MOUSE Cytosolic non-specific dipeptidase OS=Mus musculus OX=1	2.828542	0.093891	0.077567	0
P56959	>sp P56959 FUS_MOUSE RNA-binding protein FUS OS=Mus musculus OX=10090 GN=Fu	2.745705	0.536553	0.083593	0.634149
P51859	>sp P51859 HDGF_MOUSE Hepatoma-derived growth factor OS=Mus musculus OX=100	2.737521	0.229701	0.032778	0
Q920A5	>sp Q920A5 RISC_MOUSE Retinoid-inducible serine carboxypeptidase OS=Mus musculu	2.724275	0.162577	0.113148	0
P05977	>sp P05977 MYL1_MOUSE Myosin light chain 1/3, skeletal muscle isoform OS=Mus mus	2.691711	1.001778	0.131545	0.174966
Q61316	>sp Q61316 HSP74_MOUSE Heat shock 70 kDa protein 4 OS=Mus musculus OX=10090 GN	2.687345	0.281363	0.055085	0.976207
P09103	>sp P09103 PDIA1_MOUSE Protein disulfide-isomerase OS=Mus musculus OX=10090 GN	2.671075	0.049885	0.025848	1.253193
P58252	>sp P58252 EF2_MOUSE Elongation factor 2 OS=Mus musculus OX=10090 GN=Eef2 PE=	2.653032	0.620819	0.146349	0.5798
P14152	>sp P14152 MDHC_MOUSE Malate dehydrogenase, cytoplasmic OS=Mus musculus OX=	2.648709	0.049287	0.680191	0.621813
Q9R0P5	>sp Q9R0P5 DEST_MOUSE Destrin OS=Mus musculus OX=10090 GN=Dstn PE=1 SV=3	2.620433	0.292399	0.087168	0
P16858	>sp P16858 G3P_MOUSE Glyceraldehyde-3-phosphate dehydrogenase OS=Mus muscul	2.594635	0.125281	0.280085	0
P58774	>sp P58774 TPM2_MOUSE Tropomyosin beta chain OS=Mus musculus OX=10090 GN=Tj	2.577532	0.331975	0.031723	1.05877
Q9WTX5	>sp Q9WTX5 SKP1_MOUSE S-phase kinase-associated protein 1 OS=Mus musculus OX=1	2.570203	0.292352	0.137445	0
P68254	>sp P68254 1433T_MOUSE 14-3-3 protein theta OS=Mus musculus OX=10090 GN=Ywha	2.50187	0.241759	0	0.256371
P36368	>sp P36368 EGFB2_MOUSE Epidermal growth factor-binding protein type B OS=Mus mu	2.476689	0	0.272143	0.251168
P09411	>sp P09411 PGK1_MOUSE Phosphoglycerate kinase 1 OS=Mus musculus OX=10090 GN=	2.468057	0.345385	0.655478	0.53108
P02089	>sp P02089 HBB2_MOUSE Hemoglobin subunit beta-2 OS=Mus musculus OX=10090 GN	2.44634	0	0.107721	0.445938
P70296	>sp P70296 PEBP1_MOUSE Phosphatidylethanolamine-binding protein 1 OS=Mus muscu	2.434748	0.087482	0.47777	0
P16015	>sp P16015 CAH3_MOUSE Carbonic anhydrase 3 OS=Mus musculus OX=10090 GN=Ca3	2.433552	0.026684	0.371831	1.167932
Q9D0F9	>sp Q9D0F9 PGM1_MOUSE Phosphoglucomutase-1 OS=Mus musculus OX=10090 GN=P	2.430822	0	0.278628	0.29055
Q05816	>sp Q05816 FABP5_MOUSE Fatty acid-binding protein 5 OS=Mus musculus OX=10090 G	2.425315	0.240874	0.2652	1.06861
P04071	>sp P04071 K1B16_MOUSE Kallikrein 1-related peptidase b16 OS=Mus musculus OX=10	2.425207	0	0.362737	0.212056
Q9DBD0	>sp Q9DBD0 ICA_MOUSE Inhibitor of carbonic anhydrase OS=Mus musculus OX=10090 GN	2.392327	0	0.199042	0.408631
P05201	>sp P05201 AATC_MOUSE Aspartate aminotransferase, cytoplasmic OS=Mus musculus GN	2.388992	0	0.097409	0.513599
P68033	>sp P68033 ACTC_MOUSE Actin, alpha cardiac muscle 1 OS=Mus musculus OX=10090 G	2.387574	0.539586	0	0.07284
Q9CWI9	>sp Q9CWI9 PUR9_MOUSE Bifunctional purine biosynthesis protein PURH OS=Mus mus	2.365899	0	0.183375	0.450726
O70250	>sp O70250 PGAM2_MOUSE Phosphoglycerate mutase 2 OS=Mus musculus OX=10090 GN	2.361842	0.072908	0.744554	0.820697
P56480	>sp P56480 ATPB_MOUSE ATP synthase subunit beta, mitochondrial OS=Mus musculus	2.322805	0.523499	0	0.153696
P13020	>sp P13020 GELS_MOUSE Gelsolin OS=Mus musculus OX=10090 GN=Gsn PE=1 SV=3	2.313033	0.201899	0.373573	1.111495
Q61176	>sp Q61176 ARG1_MOUSE Arginase-1 OS=Mus musculus OX=10090 GN=Arg1 PE=1 SV=	2.307951	0	0.096512	0.595537
P35441	>sp P35441 TSP1_MOUSE Thrombospondin-1 OS=Mus musculus OX=10090 GN=Thbs1 F	2.300487	0.345625	0.059161	1.294727
P21107	>sp P21107 TPM3_MOUSE Tropomyosin alpha-3 chain OS=Mus musculus OX=10090 GN	2.299867	1.05353	0.018866	0.627737
Q61033	>sp Q61033 LAP2A_MOUSE Lamina-associated polypeptide 2, isoforms alpha/zeta OS=M	2.281593	0.593199	0.125208	0
P45376	>sp P45376 ALDR_MOUSE Aldose reductase OS=Mus musculus OX=10090 GN=Akr1b1 P	2.274026	0	0.397879	0.328095
P04247	>sp P04247 MYG_MOUSE Myoglobin OS=Mus musculus OX=10090 GN=Mb PE=1 SV=3	2.27313	0.282635	0	0.444235
P38647	>sp P38647 GRP75_MOUSE Stress-70 protein, mitochondrial OS=Mus musculus OX=100	2.266787	0.265041	0.468172	0
P08113	>sp P08113 ENPL_MOUSE Endoplasmin OS=Mus musculus OX=10090 GN=Hsp90b1 PE=	2.232262	0.522674	0	0.245064

P17751	>sp P17751 TPIS_MOUSE Triosephosphate isomerase OS=Mus musculus OX=10090 GN=	2.211353	0.164589	1.403992	0.220066
Q8VEK3	>sp Q8VEK3 HNRPU_MOUSE Heterogeneous nuclear ribonucleoprotein U OS=Mus musc	2.201793	0.244458	0.553749	0
P68510	>sp P68510 1433F_MOUSE 14-3-3 protein eta OS=Mus musculus OX=10090 GN=Ywhah	2.167343	0.305217	0	0.527439
Q9JM71	>sp Q9JM71 K1B27_MOUSE Kallikrein 1-related peptidase b27 OS=Mus musculus OX=10	2.167013	0	0.006101	0.826885
P02088	>sp P02088 HBB1_MOUSE Hemoglobin subunit beta-1 OS=Mus musculus OX=10090 GN	2.160172	0.120245	0.225527	1.494055
P01942	>sp P01942 HBA_MOUSE Hemoglobin subunit alpha OS=Mus musculus OX=10090 GN=F	2.143935	0.639058	0.115057	1.10195
P09528	>sp P09528 FRIH_MOUSE Ferritin heavy chain OS=Mus musculus OX=10090 GN=Fth1 PE	2.140065	0.041192	0.12075	1.697993
P27773	>sp P27773 PDIA3_MOUSE Protein disulfide-isomerase A3 OS=Mus musculus OX=10090	2.12864	0.123944	0.310252	1.437164
O70251	>sp O70251 EF1B_MOUSE Elongation factor 1-beta OS=Mus musculus OX=10090 GN=Ee	2.126108	0.817611	0.056281	0
Q04447	>sp Q04447 KCRB_MOUSE Creatine kinase B-type OS=Mus musculus OX=10090 GN=Ckt	2.115316	0.254415	1.335812	0.294457
P35492	>sp P35492 HUTH_MOUSE Histidine ammonia-lyase OS=Mus musculus OX=10090 GN=F	2.109639	0.220709	0.099359	1.570293
O88569	>sp O88569 ROA2_MOUSE Heterogeneous nuclear ribonucleoproteins A2/B1 OS=Mus n	2.094179	0.192355	0.172868	1.540598
P15949	>sp P15949 K1KB9_MOUSE Kallikrein 1-related peptidase b9 OS=Mus musculus OX=100	2.080503	0	0.16944	0.750057
P04186	>sp P04186 CFAB_MOUSE Complement factor B OS=Mus musculus OX=10090 GN=Cfb P	2.076583	0	0.176398	0.74702
P15948	>sp P15948 K1B22_MOUSE Kallikrein 1-related peptidase b22 OS=Mus musculus OX=10	2.073812	0	0.064628	0.86156
Q91VM5	>sp Q91VM5 RMXL1_MOUSE RNA binding motif protein, X-linked-like-1 OS=Mus muscu	2.056908	0	0.21363	0.729462
P26041	>sp P26041 MOES_MOUSE Moesin OS=Mus musculus OX=10090 GN=Msn PE=1 SV=3	2.039565	0.173999	1.324615	0.461822
P13412	>sp P13412 TNNI2_MOUSE Troponin I, fast skeletal muscle OS=Mus musculus OX=1009	2.036195	0.919289	0.044517	0
Q99KI0	>sp Q99KI0 ACON_MOUSE Aconitate hydratase, mitochondrial OS=Mus musculus OX=10	2.009642	0.512638	0.47772	0
O08709	>sp O08709 PRDX6_MOUSE Peroxiredoxin-6 OS=Mus musculus OX=10090 GN=Prdx6 PE	2.008383	0.142254	0.910023	0.93934
O88844	>sp O88844 IDHC_MOUSE Isocitrate dehydrogenase [NADP] cytoplasmic OS=Mus muscu	2.001045	0	0.131375	0.867581
Q8BH64	>sp Q8BH64 EHD2_MOUSE EH domain-containing protein 2 OS=Mus musculus OX=1009	1.979942	0.669573	0	0.350485
Q9CQV8	>sp Q9CQV8 1433B_MOUSE 14-3-3 protein beta/alpha OS=Mus musculus OX=10090 GN	1.968324	0	0	0.031676
Q9Z2Y8	>sp Q9Z2Y8 PLPHP_MOUSE Pyridoxal phosphate homeostasis protein OS=Mus musculu	1.952598	0	0.527397	0.520005
O89053	>sp O89053 COR1A_MOUSE Coronin-1A OS=Mus musculus OX=10090 GN=Coro1a PE=1	1.950218	0.742263	0.307519	0
P01878	>sp P01878 IGHA_MOUSE Ig alpha chain C region OS=Mus musculus OX=10090 PE=1 SV	1.949333	0	0	0.050667
P47941	>sp P47941 CRKL_MOUSE Crk-like protein OS=Mus musculus OX=10090 GN=Crkl PE=1 S	1.927011	0.586888	0.486102	0
P26040	>sp P26040 EZRI_MOUSE Ezrin OS=Mus musculus OX=10090 GN=Ezr PE=1 SV=3	1.907887	0.092113	0	0
P29218	>sp P29218 IMPA1_HUMAN Inositol monophosphatase 1 OS=Homo sapiens OX=9606 G	1.904489	0	0.095511	0
P63017	>sp P63017 HSP7C_MOUSE Heat shock cognate 71 kDa protein OS=Mus musculus OX=1	1.901368	0.102313	0.615641	1.380679
Q9Z0F7	>sp Q9Z0F7 SYUG_MOUSE Gamma-synuclein OS=Mus musculus OX=10090 GN=Sncg PE	1.897934	0.593279	0.508787	0
P49312	>sp P49312 ROA1_MOUSE Heterogeneous nuclear ribonucleoprotein A1 OS=Mus muscu	1.893075	0.106925	0	0
Q8VCN6	>sp Q8VCN6 CD99_MOUSE CD99 antigen OS=Mus musculus OX=10090 GN=Cd99 PE=1 S	1.891497	0.108503	0	0
Q93092	>sp Q93092 TALDO_MOUSE Transaldolase OS=Mus musculus OX=10090 GN=Taldo1 PE=	1.891012	0	0.549623	0.559365
P18242	>sp P18242 CATD_MOUSE Cathepsin D OS=Mus musculus OX=10090 GN=Ctsd PE=1 SV=	1.890584	0	0.164596	0.94482
Q3U0V1	>sp Q3U0V1 FUBP2_MOUSE Far upstream element-binding protein 2 OS=Mus musculus	1.874266	0.125734	0	0
Q9D9V3	>sp Q9D9V3 ECHD1_MOUSE Ethylmalonyl-CoA decarboxylase OS=Mus musculus OX=10	1.869209	0.130791	0	0
Q64726	>sp Q64726 ZA2G_MOUSE Zinc-alpha-2-glycoprotein OS=Mus musculus OX=10090 GN=	1.86415	0	0.064622	1.071229
P57016	>sp P57016 LAD1_MOUSE Ladinin-1 OS=Mus musculus OX=10090 GN=Lad1 PE=1 SV=1	1.861108	0	0.138892	0
P10605	>sp P10605 CATB_MOUSE Cathepsin B OS=Mus musculus OX=10090 GN=Ctsb PE=1 SV=	1.856428	0	0.216638	0.926935
Q8VCT4	>sp Q8VCT4 CES1D_MOUSE Carboxylesterase 1D OS=Mus musculus OX=10090 GN=Ces	1.856214	0	0.143786	0
Q99K51	>sp Q99K51 PLST_MOUSE Plastin-3 OS=Mus musculus OX=10090 GN=Pls3 PE=1 SV=3	1.851154	0	0.077874	1.070972
P26645	>sp P26645 MARC5_MOUSE Myristoylated alanine-rich C-kinase substrate OS=Mus mus	1.848431	0.431372	0	0.720198
P51855	>sp P51855 GSHB_MOUSE Glutathione synthetase OS=Mus musculus OX=10090 GN=G	1.84568	0	0.15432	0
Q9R1Q8	>sp Q9R1Q8 TAGL3_MOUSE Transgelin-3 OS=Mus musculus OX=10090 GN=Tagln3 PE=1	1.842839	0.202673	0	0.954488
Q61730	>sp Q61730 IL1AP_MOUSE Interleukin-1 receptor accessory protein OS=Mus musculus	1.838473	0	0.161527	0
P07901	>sp P07901 HS90A_MOUSE Heat shock protein HSP 90-alpha OS=Mus musculus OX=100	1.835297	0.120908	0	1.043795
P03958	>sp P03958 ADA_MOUSE Adenosine deaminase OS=Mus musculus OX=10090 GN=Ada F	1.834795	0	0.165205	0
P62631	>sp P62631 EF1A2_MOUSE Elongation factor 1-alpha 2 OS=Mus musculus OX=10090 GN	1.832106	0	0.167894	0
P61957	>sp P61957 SUMO2_MOUSE Small ubiquitin-related modifier 2 OS=Mus musculus OX=1	1.831802	1.051813	0.116385	0
Q60864	>sp Q60864 STIP1_MOUSE Stress-induced-phosphoprotein 1 OS=Mus musculus OX=100	1.827545	0.172455	0	0
Q8VE97	>sp Q8VE97 SRSF4_MOUSE Serine/arginine-rich splicing factor 4 OS=Mus musculus OX=	1.826594	0	0.173406	0
Q9JII6	>sp Q9JII6 AK1A1_MOUSE Aldo-keto reductase family 1 member A1 OS=Mus musculus	1.826107	0	0.427393	0.7465
P15946	>sp P15946 K1B11_MOUSE Kallikrein 1-related peptidase b11 OS=Mus musculus OX=10	1.824441	0	0.175559	0
P29391	>sp P29391 FRIL1_MOUSE Ferritin light chain 1 OS=Mus musculus OX=10090 GN=Ftl1 P	1.823675	0.110997	0.495387	1.569941
O70318	>sp O70318 E41L2_MOUSE Band 4.1-like protein 2 OS=Mus musculus OX=10090 GN=Ep	1.819551	0	0.180449	0
P23927	>sp P23927 CRYAB_MOUSE Alpha-crystallin B chain OS=Mus musculus OX=10090 GN=C	1.817716	0.182284	0	0
P06801	>sp P06801 MAOX_MOUSE NADP-dependent malic enzyme OS=Mus musculus OX=1009	1.814424	0.185576	0	0
P16125	>sp P16125 LDHB_MOUSE L-lactate dehydrogenase B chain OS=Mus musculus OX=1009	1.811496	0	0	0.188504
Q99L47	>sp Q99L47 F10A1_MOUSE Hsc70-interacting protein OS=Mus musculus OX=10090 GN=	1.810205	0.189795	0	0
P19157	>sp P19157 GSTP1_MOUSE Glutathione S-transferase P 1 OS=Mus musculus OX=10090	1.808619	0	0.191381	0

P26350	>sp P26350 PTMA_MOUSE Prothymosin alpha OS=Mus musculus OX=10090 GN=Ptma F	1.808566	0.191434	0	0
Q8BFZ3	>sp Q8BFZ3 ACTBL_MOUSE Beta-actin-like protein 2 OS=Mus musculus OX=10090 GN=	1.805635	0.194365	0	0
Q8CDN6	>sp Q8CDN6 TXNL1_MOUSE Thioredoxin-like protein 1 OS=Mus musculus OX=10090 GN	1.801688	0	0.198312	0
P50429	>sp P50429 ARSB_MOUSE Arylsulfatase B OS=Mus musculus OX=10090 GN=Arsb PE=1 S	1.801686	0	0.198314	0
Q9DCD0	>sp Q9DCD0 6PGD_MOUSE 6-phosphogluconate dehydrogenase, decarboxylating OS=M	1.796499	0	0	0.203501
P14869	>sp P14869 RLA0_MOUSE 60S acidic ribosomal protein P0 OS=Mus musculus OX=10090	1.794141	0	0	0.205859
Q9Z172	>sp Q9Z172 SUMO3_MOUSE Small ubiquitin-related modifier 3 OS=Mus musculus OX=1	1.791067	0	0.208933	0
Q02819	>sp Q02819 NUCB1_MOUSE Nucleobindin-1 OS=Mus musculus OX=10090 GN=Nucb1 PI	1.779523	0.872201	0	0.348277
P54227	>sp P54227 STMN1_MOUSE Stathmin OS=Mus musculus OX=10090 GN=Stmn1 PE=1 SV	1.770877	0.229123	0	0
P19096	>sp P19096 FAS_MOUSE Fatty acid synthase OS=Mus musculus OX=10090 GN=Fasn PE=	1.770695	0.229305	0	0
Q91X72	>sp Q91X72 HEMO_MOUSE Hemopexin OS=Mus musculus OX=10090 GN=Hpx PE=1 SV=	1.769726	0.013613	0.728137	1.488524
P61979	>sp P61979 HNRPK_MOUSE Heterogeneous nuclear ribonucleoprotein K OS=Mus muscu	1.769565	0.584002	0.247241	1.399191
Q61599	>sp Q61599 GDIR2_MOUSE Rho GDP-dissociation inhibitor 2 OS=Mus musculus OX=100	1.768199	1.139874	0.091927	0
O89094	>sp O89094 CASPE_MOUSE Caspase-14 OS=Mus musculus OX=10090 GN=Casp14 PE=1	1.764392	0	0.524955	0.710653
P68037	>sp P68037 UB2L3_MOUSE Ubiquitin-conjugating enzyme E2 L3 OS=Mus musculus OX=	1.754448	0	0.21812	1.027432
P58771	>sp P58771 TPM1_MOUSE Tropomyosin alpha-1 chain OS=Mus musculus OX=10090 GN	1.753065	1.732353	0.017771	0.496811
Q9CZU6	>sp Q9CZU6 CISY_MOUSE Citrate synthase, mitochondrial OS=Mus musculus OX=10090	1.74239	0.142997	0	1.114613
O70400	>sp O70400 PDLI1_MOUSE PDZ and LIM domain protein 1 OS=Mus musculus OX=10090	1.73878	0.099826	0	1.161394
Q9D6N1	>sp Q9D6N1 CAH13_MOUSE Carbonic anhydrase 13 OS=Mus musculus OX=10090 GN=C	1.731054	0	0.268946	0
Q61598	>sp Q61598 GDIB_MOUSE Rab GDP dissociation inhibitor beta OS=Mus musculus OX=10	1.729807	0.270193	0	0
Q9WVA4	>sp Q9WVA4 TAGL2_MOUSE Transgelin-2 OS=Mus musculus OX=10090 GN=Tagln2 PE=	1.729756	0.08853	0	1.181713
Q9EPQ7	>sp Q9EPQ7 STAR5_MOUSE StAR-related lipid transfer protein 5 OS=Mus musculus OX=	1.729201	0	0.270799	0
Q9WUZ7	>sp Q9WUZ7 SH3BG_MOUSE SH3 domain-binding glutamic acid-rich protein OS=Mus m	1.727625	0	0	0.272375
Q61233	>sp Q61233 PLSL_MOUSE Plastin-2 OS=Mus musculus OX=10090 GN=Lcp1 PE=1 SV=4	1.723879	0.203518	0	1.072603
Q06890	>sp Q06890 CLUS_MOUSE Clusterin OS=Mus musculus OX=10090 GN=Clu PE=1 SV=1	1.722201	0.277799	0	0
Q5I2A0	>sp Q5I2A0 SPA3G_MOUSE Serine protease inhibitor A3G OS=Mus musculus OX=10090	1.719277	0	0	0.280723
Q19LI2	>sp Q19LI2 A1BG_MOUSE Alpha-1B-glycoprotein OS=Mus musculus OX=10090 GN=A1b	1.713107	0	0.812365	0.474528
P63028	>sp P63028 TCTP_MOUSE Translationally-controlled tumor protein OS=Mus musculus O	1.710491	0.289509	0	0
Q5XKE0	>sp Q5XKE0 MYPC2_MOUSE Myosin-binding protein C, fast-type OS=Mus musculus OX=	1.708021	0	0	0.291979
P45591	>sp P45591 COF2_MOUSE Cofilin-2 OS=Mus musculus OX=10090 GN=Cfl2 PE=1 SV=1	1.704003	0.295997	0	0
P06745	>sp P06745 G6PI_MOUSE Glucose-6-phosphate isomerase OS=Mus musculus OX=10090	1.703299	0	0.051968	1.244733
O09131	>sp O09131 GSTO1_MOUSE Glutathione S-transferase omega-1 OS=Mus musculus OX=	1.702659	0	0.297341	0
Q05186	>sp Q05186 RCN1_MOUSE Reticulocalbin-1 OS=Mus musculus OX=10090 GN=Rcn1 PE=	1.700079	0.299921	0	0
Q9EST1	>sp Q9EST1 GSDMA_MOUSE Gasdermin-A OS=Mus musculus OX=10090 GN=Gsdma PE=	1.698947	0.301053	0	0
P17742	>sp P17742 PPIA_MOUSE Peptidyl-prolyl cis-trans isomerase A OS=Mus musculus OX=10	1.697719	0.108769	1.007121	1.186391
O08795	>sp O08795 GLU2B_MOUSE Glucosidase 2 subunit beta OS=Mus musculus OX=10090 GI	1.697306	0	0.100077	1.202617
P70124	>sp P70124 SPB5_MOUSE Serpin B5 OS=Mus musculus OX=10090 GN=Serpib5 PE=1 SV	1.697286	0.302714	0	0
O70451	>sp O70451 MOT2_MOUSE Monocarboxylate transporter 2 OS=Mus musculus OX=1009	1.694894	0	0.663707	0.641399
Q64433	>sp Q64433 CH10_MOUSE 10 kDa heat shock protein, mitochondrial OS=Mus musculus	1.687007	0	0.312993	0
P56542	>sp P56542 DNS2A_MOUSE Deoxyribonuclease-2-alpha OS=Mus musculus OX=10090 G	1.684342	0	0.315658	0
P04939	>sp P04939 MUP3_MOUSE Major urinary protein 3 OS=Mus musculus OX=10090 GN=M	1.680966	0	0.319034	0
Q60994	>sp Q60994 ADIPO_MOUSE Adiponectin OS=Mus musculus OX=10090 GN=Adipoq PE=1	1.679062	0	0.12424	1.196698
P11031	>sp P11031 TCP4_MOUSE Activated RNA polymerase II transcriptional coactivator p15 C	1.672847	0.2975	0.167711	1.861942
Q99JW2	>sp Q99JW2 ACY1_MOUSE Aminoacylase-1 OS=Mus musculus OX=10090 GN=Acy1 PE=	1.666174	0	0.308586	1.02524
P43025	>sp P43025 TETN_MOUSE Tetranectin OS=Mus musculus OX=10090 GN=Clec3b PE=1 SV	1.657964	0.342036	0	0
P47739	>sp P47739 AL3A1_MOUSE Aldehyde dehydrogenase, dimeric NADP-preferring OS=Mus	1.653889	0	0.346111	0
P32848	>sp P32848 PRVA_MOUSE Parvalbumin alpha OS=Mus musculus OX=10090 GN=Pvalb P	1.650644	0.359543	0.721442	1.268372
Q9WTQ5	>sp Q9WTQ5 AKA12_MOUSE A-kinase anchor protein 12 OS=Mus musculus OX=10090 C	1.648568	0	0.351432	0
P17563	>sp P17563 SBP1_MOUSE Methanethiol oxidase OS=Mus musculus OX=10090 GN=Seler	1.646956	0	0.353044	0
Q9JKF1	>sp Q9JKF1 IQGA1_MOUSE Ras GTPase-activating-like protein IQGAP1 OS=Mus muscul	1.643389	0.12388	0	1.232731
P60843	>sp P60843 IF4A1_MOUSE Eukaryotic initiation factor 4A-I OS=Mus musculus OX=10090	1.64205	0.35795	0	0
P98078	>sp P98078 DAB2_MOUSE Disabled homolog 2 OS=Mus musculus OX=10090 GN=Dab2 I	1.641378	0.358622	0	0
Q99020	>sp Q99020 ROAA_MOUSE Heterogeneous nuclear ribonucleoprotein A/B OS=Mus mus	1.640124	0.359876	0	0
Q60648	>sp Q60648 SAP3_MOUSE Ganglioside GM2 activator OS=Mus musculus OX=10090 GN=	1.640089	0.13345	0.022868	2.203594
P14211	>sp P14211 CALR_MOUSE Calreticulin OS=Mus musculus OX=10090 GN=Calr PE=1 SV=1	1.636839	0.049853	0.01636	2.296948
P09803	>sp P09803 CADH1_MOUSE Cadherin-1 OS=Mus musculus OX=10090 GN=Cdh1 PE=1 SV	1.635471	0.49067	0.245902	1.627956
P63087	>sp P63087 PP1G_MOUSE Serine/threonine-protein phosphatase PP1-gamma catalytic	1.6342	0	0	0.3658
Q61704	>sp Q61704 ITIH3_MOUSE Inter-alpha-trypsin inhibitor heavy chain H3 OS=Mus muscul	1.633639	0	0	0.366361
P50428	>sp P50428 ARSA_MOUSE Arylsulfatase A OS=Mus musculus OX=10090 GN=Arsa PE=1 S	1.631248	0	0	0.368752
Q9WVJ3	>sp Q9WVJ3 CBPQ_MOUSE Carboxypeptidase Q OS=Mus musculus OX=10090 GN=Cpq	1.630332	0	0.369668	0
Q09PK2	>sp Q09PK2 APRV1_MOUSE Retroviral-like aspartic protease 1 OS=Mus musculus OX=10	1.625012	0.374988	0	0

P07628	>sp P07628 K1KB8_MOUSE Kallikrein 1-related peptidase b8 OS=Mus musculus OX=100	1.618791	0	0	0.381209
P63158	>sp P63158 HMGB1_MOUSE High mobility group protein B1 OS=Mus musculus OX=100	1.612542	1.243367	0	0.144092
P56395	>sp P56395 CYB5_MOUSE Cytochrome b5 OS=Mus musculus OX=10090 GN=Cyb5a PE=1	1.612164	0.407547	0	0.980289
Q61147	>sp Q61147 CERU_MOUSE Ceruloplasmin OS=Mus musculus OX=10090 GN=Cp PE=1 SV	1.602588	0	0.318945	1.078467
P29341	>sp P29341 PABP1_MOUSE Polyadenylate-binding protein 1 OS=Mus musculus OX=100	1.596833	0.199933	0	1.203234
P62774	>sp P62774 MTPN_MOUSE Myotrophin OS=Mus musculus OX=10090 GN=Mtpn PE=1 S	1.595112	0.404888	0	0
Q62446	>sp Q62446 FKBP3_MOUSE Peptidyl-prolyl cis-trans isomerase FKBP3 OS=Mus musculu	1.59481	0	0.40519	0
Q9QUH0	>sp Q9QUH0 GLRX1_MOUSE Glutaredoxin-1 OS=Mus musculus OX=10090 GN=Glrx PE=	1.591443	0.295976	0.318763	1.793818
Q60664	>sp Q60664 LRMP_MOUSE Lymphoid-restricted membrane protein OS=Mus musculus C	1.589465	0.377743	1.276317	0.756474
Q923D2	>sp Q923D2 BLVRB_MOUSE Flavin reductase (NADPH) OS=Mus musculus OX=10090 GN	1.587656	0	0.116203	1.296141
P01680	>sp P01680 KV4A1_MOUSE Ig kappa chain V-IV region S107B OS=Mus musculus OX=100	1.586617	0	0.413383	0
P23953	>sp P23953 EST1C_MOUSE Carboxylesterase 1C OS=Mus musculus OX=10090 GN=Ces1	1.583156	0.021329	1.226236	1.169279
A2ABU4	>sp A2ABU4 MYOM3_MOUSE Myomesin-3 OS=Mus musculus OX=10090 GN=Myom3 P	1.570737	0	0.429263	0
P16627	>sp P16627 HS71L_MOUSE Heat shock 70 kDa protein 1-like OS=Mus musculus OX=100	1.570548	0	0.429452	0
Q9JJU8	>sp Q9JJU8 SH3L1_MOUSE SH3 domain-binding glutamic acid-rich-like protein OS=Mus	1.569205	0	0.27147	1.159325
Q9R1P0	>sp Q9R1P0 PSA4_MOUSE Proteasome subunit alpha type-4 OS=Mus musculus OX=100	1.561905	0	0	0.438095
O35640	>sp O35640 ANXA8_MOUSE Annexin A8 OS=Mus musculus OX=10090 GN=Anxa8 PE=1	1.560071	0.439929	0	0
P57776	>sp P57776 EF1D_MOUSE Elongation factor 1-delta OS=Mus musculus OX=10090 GN=E	1.55752	0.44248	0	0
P63101	>sp P63101 1433Z_MOUSE 14-3-3 protein zeta/delta OS=Mus musculus OX=10090 GN=	1.551493	0.07687	0.135674	2.235963
P29758	>sp P29758 OAT_MOUSE Ornithine aminotransferase, mitochondrial OS=Mus musculus	1.549552	0	0.450448	0
A2ASS6	>sp A2ASS6 TITIN_MOUSE Titin OS=Mus musculus OX=10090 GN=Ttn PE=1 SV=1	1.544805	0.631878	0.901191	0.922126
P00756	>sp P00756 K1KB3_MOUSE Kallikrein 1-related peptidase b3 OS=Mus musculus OX=100	1.54465	0	0	0.45535
P10854	>sp P10854 H2B1M_MOUSE Histone H2B type 1-M OS=Mus musculus OX=10090 GN=H	1.538447	0.461553	0	0
Q9QUR6	>sp Q9QUR6 PPCE_MOUSE Prolyl endopeptidase OS=Mus musculus OX=10090 GN=Pre	1.519253	0	0.480747	0
Q9CPY7	>sp Q9CPY7 AMPL_MOUSE Cytosol aminopeptidase OS=Mus musculus OX=10090 GN=L	1.518534	0	0.481466	0
Q06770	>sp Q06770 CBG_MOUSE Corticosteroid-binding globulin OS=Mus musculus OX=10090	1.517574	0	0	0.482426
P47791	>sp P47791 GSHR_MOUSE Glutathione reductase, mitochondrial OS=Mus musculus OX=	1.513628	0.050349	0.165972	2.27005
P29699	>sp P29699 FETUA_MOUSE Alpha-2-HS-glycoprotein OS=Mus musculus OX=10090 GN=	1.513622	0.486378	0	0
Q9R069	>sp Q9R069 BCAM_MOUSE Basal cell adhesion molecule OS=Mus musculus OX=10090	1.509625	0	0.490375	0
Q11136	>sp Q11136 PEPD_MOUSE Xaa-Pro dipeptidase OS=Mus musculus OX=10090 GN=Pepd	1.508293	0	0.367357	1.12435
P00757	>sp P00757 K1KB4_MOUSE Kallikrein 1-related peptidase-like b4 OS=Mus musculus OX=	1.49381	0	0.046128	1.460061
Q9CQ92	>sp Q9CQ92 FIS1_MOUSE Mitochondrial fission 1 protein OS=Mus musculus OX=10090	1.492054	0.772518	0	0.735428
P31786	>sp P31786 ACBP_MOUSE Acyl-CoA-binding protein OS=Mus musculus OX=10090 GN=D	1.49079	0.079314	0.556369	1.873527
Q7TMK9	>sp Q7TMK9 HNRPQ_MOUSE Heterogeneous nuclear ribonucleoprotein Q OS=Mus mus	1.486804	0	0	0.513196
O08807	>sp O08807 PRDX4_MOUSE Peroxiredoxin-4 OS=Mus musculus OX=10090 GN=Prdx4 PE	1.485729	0	0.32627	1.188
P47754	>sp P47754 CAZA2_MOUSE F-actin-capping protein subunit alpha-2 OS=Mus musculus C	1.478302	0.111747	0	1.409951
P45952	>sp P45952 ACADM_MOUSE Medium-chain specific acyl-CoA dehydrogenase, mitochon	1.478232	0	0.521768	0
P00755	>sp P00755 K1KB1_MOUSE Kallikrein 1-related peptidase b1 OS=Mus musculus OX=100	1.477536	0	0	0.522464
Q01768	>sp Q01768 NDKB_MOUSE Nucleoside diphosphate kinase B OS=Mus musculus OX=100	1.477048	0.052696	0.415329	2.054927
P0C0S6	>sp P0C0S6 H2AZ_MOUSE Histone H2A.Z OS=Mus musculus OX=10090 GN=H2afz PE=1	1.475183	0	0	0.524817
Q8K157	>sp Q8K157 GALM_MOUSE Aldose 1-epimerase OS=Mus musculus OX=10090 GN=Galm	1.473807	0	0	0.526193
Q8R0W0	>sp Q8R0W0 EPIPL_MOUSE Epiplakin OS=Mus musculus OX=10090 GN=Eppk1 PE=1 SV=	1.47153	0.196708	0.554968	1.776794
Q9CT10	>sp Q9CT10 RANB3_MOUSE Ran-binding protein 3 OS=Mus musculus OX=10090 GN=Ra	1.4715	0	0.5285	0
O35459	>sp O35459 ECH1_MOUSE Delta(3,5)-Delta(2,4)-dienoyl-CoA isomerase, mitochondrial	1.469161	0	0	0.530839
Q8BP92	>sp Q8BP92 RCN2_MOUSE Reticulocalbin-2 OS=Mus musculus OX=10090 GN=Rcn2 PE=	1.459277	0.540723	0	0
P14733	>sp P14733 LMNB1_MOUSE Lamin-B1 OS=Mus musculus OX=10090 GN=Lmnb1 PE=1 S	1.45869	0.509088	0.504888	1.527334
P56375	>sp P56375 ACYP2_MOUSE Acylphosphatase-2 OS=Mus musculus OX=10090 GN=Acyp2	1.458461	0	0.559496	0.982043
Q5EBG6	>sp Q5EBG6 HSPB6_MOUSE Heat shock protein beta-6 OS=Mus musculus OX=10090 GN	1.457664	0.542336	0	0
P35700	>sp P35700 PRDX1_MOUSE Peroxiredoxin-1 OS=Mus musculus OX=10090 GN=Prdx1 PE	1.455985	0	0.395186	1.148829
P70372	>sp P70372 ELAV1_MOUSE ELAV-like protein 1 OS=Mus musculus OX=10090 GN=Elavl	1.453238	0	0	0.546762
Q9CXI5	>sp Q9CXI5 MANF_MOUSE Mesencephalic astrocyte-derived neurotrophic factor OS=M	1.446571	0.281583	0.401891	1.869955
Q00623	>sp Q00623 APOA1_MOUSE Apolipoprotein A-I OS=Mus musculus OX=10090 GN=Apoa	1.443159	1.131679	0.056371	1.368792
P24452	>sp P24452 CAPG_MOUSE Macrophage-capping protein OS=Mus musculus OX=10090 G	1.430401	0.302858	0.234286	2.032455
Q01853	>sp Q01853 TERA_MOUSE Transitional endoplasmic reticulum ATPase OS=Mus musculu	1.429883	0.570117	0	0
Q91VW3	>sp Q91VW3 SH3L3_MOUSE SH3 domain-binding glutamic acid-rich-like protein 3 OS=V	1.426967	0	0.573033	0
Q7TPR4	>sp Q7TPR4 ACTN1_MOUSE Alpha-actinin-1 OS=Mus musculus OX=10090 GN=Actn1 PE	1.423679	0.884505	0	0.691816
P22935	>sp P22935 RABP2_MOUSE Cellular retinoic acid-binding protein 2 OS=Mus musculus O	1.41898	0	0.58102	0
Q08189	>sp Q08189 TGM3_MOUSE Protein-glutamine gamma-glutamyltransferase E OS=Mus m	1.415399	0.085188	0.037946	2.461468
P14069	>sp P14069 S10A6_MOUSE Protein S100-A6 OS=Mus musculus OX=10090 GN=S100a6 P	1.414556	0.139898	0.234544	2.211002
P62960	>sp P62960 YBOX1_MOUSE Nuclease-sensitive element-binding protein 1 OS=Mus musc	1.411085	0.588915	0	0
Q99KB8	>sp Q99KB8 GLO2_MOUSE Hydroxyacylglutathione hydrolase, mitochondrial OS=Mus m	1.407724	0	0.592276	0

Q9D3D9	>sp Q9D3D9 ATPD_MOUSE ATP synthase subunit delta, mitochondrial OS=Mus musculus	1.40394	0.59606	0	0
Q99KC8	>sp Q99KC8 VMA5A_MOUSE von Willebrand factor A domain-containing protein 5A OS=	1.396327	0	0	0.603673
Q9D0J8	>sp Q9D0J8 PTMS_MOUSE Parathymosin OS=Mus musculus OX=10090 GN=Ptms PE=1 S	1.395669	0.604331	0	0
A2ADY9	>sp A2ADY9 DDI2_MOUSE Protein DDI1 homolog 2 OS=Mus musculus OX=10090 GN=Dc	1.39428	1.286176	0.319544	0
P40142	>sp P40142 TKT_MOUSE Transketolase OS=Mus musculus OX=10090 GN=Tkt PE=1 SV=1	1.388576	0	0.139788	1.471636
Q8BVI4	>sp Q8BVI4 DHPR_MOUSE Dihydropteridine reductase OS=Mus musculus OX=10090 GN	1.387954	0	0.612046	0
O88990	>sp O88990 ACTN3_MOUSE Alpha-actinin-3 OS=Mus musculus OX=10090 GN=Actn3 PE=	1.38233	0.61767	0	0
P63038	>sp P63038 CH60_MOUSE 60 kDa heat shock protein, mitochondrial OS=Mus musculus	1.381933	0.618067	0	0
P07309	>sp P07309 TTHY_MOUSE Transthyretin OS=Mus musculus OX=10090 GN=Ttr PE=1 SV=	1.376202	0.090258	1.282655	1.250885
Q8BH97	>sp Q8BH97 RCN3_MOUSE Reticulocalbin-3 OS=Mus musculus OX=10090 GN=Rcn3 PE=	1.375055	1.55589	0.069054	0
O35900	>sp O35900 LSM2_MOUSE U6 snRNA-associated Sm-like protein LSm2 OS=Mus muscul	1.374302	0	0	0.625698
P24270	>sp P24270 CATA_MOUSE Catalase OS=Mus musculus OX=10090 GN=Cat PE=1 SV=4	1.370836	0	0	0.629164
P01630	>sp P01630 KV2A6_MOUSE Ig kappa chain V-II region 7S34.1 OS=Mus musculus OX=100	1.367143	0	0	0.632857
Q60854	>sp Q60854 SPB6_MOUSE Serpin B6 OS=Mus musculus OX=10090 GN=Serpnb6 PE=1 S	1.366503	0	0	0.633497
P11590	>sp P11590 MUP4_MOUSE Major urinary protein 4 OS=Mus musculus OX=10090 GN=M	1.363985	0	0	0.636015
B2RRF6	>sp B2RRF6 Z518A_MOUSE Zinc finger protein 518A OS=Mus musculus OX=10090 GN=Z	1.362651	0	0.637349	0
Q9QZ47	>sp Q9QZ47 TNNT3_MOUSE Troponin T, fast skeletal muscle OS=Mus musculus OX=100	1.360716	0.639284	0	0
Q9WTP6	>sp Q9WTP6 KAD2_MOUSE Adenylate kinase 2, mitochondrial OS=Mus musculus OX=10	1.350558	0	0.034775	1.614668
P11589	>sp P11589 MUP2_MOUSE Major urinary protein 2 OS=Mus musculus OX=10090 GN=M	1.349306	0.348231	1.655912	0.646551
Q8K0E8	>sp Q8K0E8 FIBB_MOUSE Fibrinogen beta chain OS=Mus musculus OX=10090 GN=Fgb F	1.349231	0.363743	0.582473	1.704553
P54071	>sp P54071 IDHP_MOUSE Isocitrate dehydrogenase [NADP], mitochondrial OS=Mus mu	1.341953	0	0.43413	1.223917
P08003	>sp P08003 PDIA4_MOUSE Protein disulfide-isomerase A4 OS=Mus musculus OX=10090	1.340565	0	0	0.659435
P03953	>sp P03953 CFAD_MOUSE Complement factor D OS=Mus musculus OX=10090 GN=Cfd F	1.333155	0.059528	0.93103	1.676287
P04117	>sp P04117 FABP4_MOUSE Fatty acid-binding protein, adipocyte OS=Mus musculus OX=	1.324267	0.156885	0.293513	2.225335
P01660	>sp P01660 KV3A8_MOUSE Ig kappa chain V-III region PC 3741/TEPC 111 OS=Mus musc	1.321995	0	0	0.678005
P01633	>sp P01633 KV5A1_MOUSE Ig kappa chain V19-17 OS=Mus musculus OX=10090 GN=lgk	1.318111	0	0	0.681889
P61982	>sp P61982 1433G_MOUSE 14-3-3 protein gamma OS=Mus musculus OX=10090 GN=Yw	1.316965	0.146428	0	1.536607
P49935	>sp P49935 CATH_MOUSE Pro-cathepsin H OS=Mus musculus OX=10090 GN=Ctsh PE=1	1.314602	0	0.927825	0.757573
P08551	>sp P08551 NFL_MOUSE Neurofilament light polypeptide OS=Mus musculus OX=10090	1.308389	0	0	0.691611
Q83017	>sp Q83017 RPOA_LDVP Replicase polypeptide 1ab OS=Lactate dehydrogenase elevating	1.304046	0	0	0.695954
Q91XV3	>sp Q91XV3 BASP1_MOUSE Brain acid soluble protein 1 OS=Mus musculus OX=10090 G	1.296575	0.703425	0	0
O88456	>sp O88456 CPNS1_MOUSE Calpain small subunit 1 OS=Mus musculus OX=10090 GN=C	1.293385	0	0	0.706615
P54726	>sp P54726 RD23A_MOUSE UV excision repair protein RAD23 homolog A OS=Mus musc	1.289435	0	0	0.710565
Q921I1	>sp Q921I1 TRFE_MOUSE Serotransferrin OS=Mus musculus OX=10090 GN=Tf PE=1 SV=	1.284137	0.011323	0.285316	2.419224
O08677	>sp O08677 KNG1_MOUSE Kininogen-1 OS=Mus musculus OX=10090 GN=Kng1 PE=1 SV	1.281083	0	0.122903	1.596014
P97807	>sp P97807 FUMH_MOUSE Fumarate hydratase, mitochondrial OS=Mus musculus OX=1	1.272847	0.983394	0.743759	0
Q9JL35	>sp Q9JL35 HMG5_MOUSE High mobility group nucleosome-binding domain-containin	1.271792	0	0	0.728208
P06330	>sp P06330 HVM51_MOUSE Ig heavy chain V region AC38 205.12 OS=Mus musculus OX	1.26992	0	0	0.73008
P43274	>sp P43274 H14_MOUSE Histone H1.4 OS=Mus musculus OX=10090 GN=Hist1h1e PE=1	1.268769	0	0	0.731231
P11404	>sp P11404 FABPH_MOUSE Fatty acid-binding protein, heart OS=Mus musculus OX=100	1.2609	0	0.891582	0.847518
Q8BHN3	>sp Q8BHN3 GANAB_MOUSE Neutral alpha-glucosidase AB OS=Mus musculus OX=1009	1.256441	0	0	0.743559
Q9CQJ6	>sp Q9CQJ6 DENR_MOUSE Density-regulated protein OS=Mus musculus OX=10090 GN=	1.251029	0.95516	0	0.793811
P58044	>sp P58044 IDI1_MOUSE Isopentenyl-diphosphate Delta-isomerase 1 OS=Mus musculus	1.238123	0	0.366911	1.394966
Q3UHX2	>sp Q3UHX2 HAP28_MOUSE 28 kDa heat- and acid-stable phosphoprotein OS=Mus mus	1.237803	0	0	0.762197
Q62348	>sp Q62348 TSN_MOUSE Translin OS=Mus musculus OX=10090 GN=Tsn PE=1 SV=1	1.227377	0.772623	0	0
P07091	>sp P07091 S10A4_MOUSE Protein S100-A4 OS=Mus musculus OX=10090 GN=S100a4 P	1.220177	0.32098	0.407326	2.051517
Q922R8	>sp Q922R8 PDIA6_MOUSE Protein disulfide-isomerase A6 OS=Mus musculus OX=1009	1.218827	0.726276	0.335565	1.719332
P63260	>sp P63260 ACTG_MOUSE Actin, cytoplasmic 2 OS=Mus musculus OX=10090 GN=Actg1	1.213184	0.152208	0	1.634609
P17182	>sp P17182 ENOA_MOUSE Alpha-enolase OS=Mus musculus OX=10090 GN=Eno1 PE=1	1.205918	0.755082	1.039001	0
Q9DCL8	>sp Q9DCL8 IPP2_MOUSE Protein phosphatase inhibitor 2 OS=Mus musculus OX=10090	1.201801	0	0.798199	0
O35658	>sp O35658 C1QBP_MOUSE Complement component 1 Q subcomponent-binding prote	1.195202	0.642954	0	1.161844
P00493	>sp P00493 HPRT_MOUSE Hypoxanthine-guanine phosphoribosyltransferase OS=Mus m	1.194785	0	0	0.805215
Q9QXS1	>sp Q9QXS1 PLEC_MOUSE Plectin OS=Mus musculus OX=10090 GN=Plec PE=1 SV=3	1.191176	0.808824	0	0
P21550	>sp P21550 ENOB_MOUSE Beta-enolase OS=Mus musculus OX=10090 GN=Eno3 PE=1 S	1.186121	0.022859	1.79102	0
Q9D7X8	>sp Q9D7X8 GGCT_MOUSE Gamma-glutamylcyclotransferase OS=Mus musculus OX=10	1.182421	0	0.99556	0.822019
Q9D8Y0	>sp Q9D8Y0 EFHD2_MOUSE EF-hand domain-containing protein D2 OS=Mus musculus	1.181914	0.097094	0.051351	2.669641
Q99LX0	>sp Q99LX0 PARK7_MOUSE Protein/nucleic acid deglycase DJ-1 OS=Mus musculus OX=1	1.174914	0.825086	0	0
Q9JMH6	>sp Q9JMH6 TRXR1_MOUSE Thioredoxin reductase 1, cytoplasmic OS=Mus musculus O	1.173783	0	0	0.826217
D3YXK1	>sp D3YXK1 SAMD1_MOUSE Atherin OS=Mus musculus OX=10090 GN=Samd1 PE=1 SV=	1.171765	0	0	0.828235
P01837	>sp P01837 IGKC_MOUSE Immunoglobulin kappa constant OS=Mus musculus OX=1009	1.168787	0	0	0.831213
Q9DAK9	>sp Q9DAK9 PHP14_MOUSE 14 kDa phosphohistidine phosphatase OS=Mus musculus O	1.167981	0	0	0.832019

Q9JM83	>sp Q9JM83 CALM4_MOUSE Calmodulin-4 OS=Mus musculus OX=10090 GN=Calm4 PE=	1.165811	0.381734	0.4805	1.971954
P01843	>sp P01843 LAC1_MOUSE Ig lambda-1 chain C region OS=Mus musculus OX=10090 PE=1	1.157703	0	0	0.842297
Q9DC77	>sp Q9DC77 SMPX_MOUSE Small muscular protein OS=Mus musculus OX=10090 GN=Sr	1.152498	0	0	0.847502
Q60605	>sp Q60605 MYL6_MOUSE Myosin light polypeptide 6 OS=Mus musculus OX=10090 GN	1.142928	0.857072	0	0
Q9R1P4	>sp Q9R1P4 PSA1_MOUSE Proteasome subunit alpha type-1 OS=Mus musculus OX=100	1.138949	0.793351	0	1.067699
P10639	>sp P10639 THIO_MOUSE Thioredoxin OS=Mus musculus OX=10090 GN=Txn PE=1 SV=3	1.137941	0.409627	0.922804	1.529628
Q9CPU0	>sp Q9CPU0 LGUL_MOUSE Lactoylglutathione lyase OS=Mus musculus OX=10090 GN=G	1.136431	0	0.298999	1.564571
Q64727	>sp Q64727 VINC_MOUSE Vinculin OS=Mus musculus OX=10090 GN=Vcl PE=1 SV=4	1.133892	0.042979	0.018407	2.804721
P20029	>sp P20029 BIP_MOUSE Endoplasmic reticulum chaperone BiP OS=Mus musculus OX=10	1.13121	0.479547	0.810593	1.57865
P99027	>sp P99027 RLA2_MOUSE 60S acidic ribosomal protein P2 OS=Mus musculus OX=10090	1.129006	1.737331	0	0.133663
O70370	>sp O70370 CATS_MOUSE Cathepsin S OS=Mus musculus OX=10090 GN=Ctss PE=1 SV=2	1.126335	0	0.251354	1.622311
Q61937	>sp Q61937 NPM_MOUSE Nucleophosmin OS=Mus musculus OX=10090 GN=Npm1 PE=	1.124584	0	0	0.875416
P56376	>sp P56376 ACYP1_MOUSE Acylphosphatase-1 OS=Mus musculus OX=10090 GN=Acyp1	1.122674	0	1.350822	0.526504
Q9WUM3	>sp Q9WUM3 COR1B_MOUSE Coronin-1B OS=Mus musculus OX=10090 GN=Coro1b PE=	1.121992	0	0	0.878008
P28650	>sp P28650 PURA1_MOUSE Adenylosuccinate synthetase isozyme 1 OS=Mus musculus (	1.121242	0	1.262381	0.616377
P34884	>sp P34884 MIF_MOUSE Macrophage migration inhibitory factor OS=Mus musculus OX=	1.117063	0	0.882937	0
O70209	>sp O70209 PDLI3_MOUSE PDZ and LIM domain protein 3 OS=Mus musculus OX=10090	1.112203	0	0.189533	1.698263
P97371	>sp P97371 PSME1_MOUSE Proteasome activator complex subunit 1 OS=Mus musculus	1.111292	0.888708	0	0
P62858	>sp P62858 RS28_MOUSE 40S ribosomal protein S28 OS=Mus musculus OX=10090 GN=	1.103507	0.896493	0	0
P07724	>sp P07724 ALBU_MOUSE Serum albumin OS=Mus musculus OX=10090 GN=Alb PE=1 SV=	1.100515	0.169525	1.075794	1.654166
P46412	>sp P46412 GPX3_MOUSE Glutathione peroxidase 3 OS=Mus musculus OX=10090 GN=C	1.095172	0.264214	1.640614	0
P01674	>sp P01674 KV3AM_MOUSE Ig kappa chain V-III region PC 2154 OS=Mus musculus OX=1	1.094023	0	0	0.905977
P16110	>sp P16110 LEG3_MOUSE Galectin-3 OS=Mus musculus OX=10090 GN=Lgals3 PE=1 SV=	1.091012	0	0.908988	0
Q9DAR7	>sp Q9DAR7 DCPS_MOUSE m7GpppX diphosphatase OS=Mus musculus OX=10090 GN=	1.077937	0	0	0.922063
P23198	>sp P23198 CBX3_MOUSE Chromobox protein homolog 3 OS=Mus musculus OX=10090	1.076707	0.316736	0	1.606557
Q5SUF2	>sp Q5SUF2 LC7L3_MOUSE Luc7-like protein 3 OS=Mus musculus OX=10090 GN=Luc7l3	1.076633	0	0	0.923367
Q9CQU0	>sp Q9CQU0 TXD12_MOUSE Thioredoxin domain-containing protein 12 OS=Mus muscu	1.076569	0.923431	0	0
Q8R1F5	>sp Q8R1F5 HYI_MOUSE Putative hydroxypyruvate isomerase OS=Mus musculus OX=10	1.074676	0	0.538425	1.386899
P26039	>sp P26039 TLN1_MOUSE Talin-1 OS=Mus musculus OX=10090 GN=Tln1 PE=1 SV=2	1.073347	0	0	0.926653
P21981	>sp P21981 TGM2_MOUSE Protein-glutamine gamma-glutamyltransferase 2 OS=Mus m	1.069675	0	0	0.930325
P51125	>sp P51125 ICAL_MOUSE Calpastatin OS=Mus musculus OX=10090 GN=Cast PE=1 SV=2	1.068203	0.931797	0	0
P13634	>sp P13634 CAH1_MOUSE Carbonic anhydrase 1 OS=Mus musculus OX=10090 GN=Ca1	1.055646	0	0.566625	1.377729
Q62009	>sp Q62009 POSTN_MOUSE Periostin OS=Mus musculus OX=10090 GN=Postn PE=1 SV=	1.05222	0.576843	0	1.370937
Q8R1U2	>sp Q8R1U2 CGRE1_MOUSE Cell growth regulator with EF hand domain protein 1 OS=IV	1.047949	0	0.952051	0
P01863	>sp P01863 GCAA_MOUSE Ig gamma-2A chain C region, A allele OS=Mus musculus OX=1	1.047264	0	0	0.952736
P18525	>sp P18525 HVM54_MOUSE Ig heavy chain V region 5-84 OS=Mus musculus OX=10090	1.045125	0	0	0.954875
Q64213	>sp Q64213 SF01_MOUSE Splicing factor 1 OS=Mus musculus OX=10090 GN=Sf1 PE=1 S	1.037976	0	0	0.962024
Q3TCN2	>sp Q3TCN2 PLBL2_MOUSE Putative phospholipase B-like 2 OS=Mus musculus OX=1009	1.03786	0.23369	0.53718	2.19127
Q9Z0E6	>sp Q9Z0E6 GBP2_MOUSE Guanylate-binding protein 2 OS=Mus musculus OX=10090 G	1.036126	0.963874	0	0
Q9QXC1	>sp Q9QXC1 FETUB_MOUSE Fetuin-B OS=Mus musculus OX=10090 GN=Fetub PE=1 SV=	1.031066	0.068453	1.634374	1.266107
Q99PT1	>sp Q99PT1 GDIR1_MOUSE Rho GDP-dissociation inhibitor 1 OS=Mus musculus OX=100	1.026067	0.15119	1.320374	1.502369
P20801	>sp P20801 TNNC2_MOUSE Troponin C, skeletal muscle OS=Mus musculus OX=10090 G	1.02516	0.350446	0.03444	2.589954
P21614	>sp P21614 VTDB_MOUSE Vitamin D-binding protein OS=Mus musculus OX=10090 GN=	1.024133	0.157308	0.954491	1.864068
P30416	>sp P30416 FKBP4_MOUSE Peptidyl-prolyl cis-trans isomerase FKBP4 OS=Mus musculus	1.023523	0	0.300546	1.67593
P47857	>sp P47857 PFKAM_MOUSE ATP-dependent 6-phosphofructokinase, muscle type OS=M	1.018658	0.981342	0	0
Q9Z2U0	>sp Q9Z2U0 PSA7_MOUSE Proteasome subunit alpha type-7 OS=Mus musculus OX=100	1.018585	0	0	0.981415
Q9CQ45	>sp Q9CQ45 NENF_MOUSE Neudesin OS=Mus musculus OX=10090 GN=Nenf PE=1 SV=1	1.010821	0.218489	0	1.770689
Q80XI7	>sp Q80XI7 VOME_MOUSE Vomeromodulin OS=Mus musculus OX=10090 GN=Bpifb9a F	1.005597	0	0	0.994403
Q9Z204	>sp Q9Z204 HNRPC_MOUSE Heterogeneous nuclear ribonucleoproteins C1/C2 OS=Mus	1.003804	0.143814	0.096583	2.755798
O35685	>sp O35685 NUDC_MOUSE Nuclear migration protein nudC OS=Mus musculus OX=1009	1.00172	0	0.445902	1.552378
Q99MV1	>sp Q99MV1 TDRD1_MOUSE Tudor domain-containing protein 1 OS=Mus musculus OX=	0.996801	0.682008	0	1.321191
P07759	>sp P07759 SPA3K_MOUSE Serine protease inhibitor A3K OS=Mus musculus OX=10090	0.993471	0.379654	0.295182	2.331693
P08228	>sp P08228 SODC_MOUSE Superoxide dismutase [Cu-Zn] OS=Mus musculus OX=10090	0.992636	0.087483	0.281298	2.638584
P08071	>sp P08071 TRFL_MOUSE Lactotransferrin OS=Mus musculus OX=10090 GN=Ltf PE=1 SV=	0.992296	0	0	1.007704
O08997	>sp O08997 ATOX1_MOUSE Copper transport protein ATOX1 OS=Mus musculus OX=100	0.973944	0.227178	0.272973	2.525906
Q9D7Q1	>sp Q9D7Q1 CHIT1_MOUSE Chitotriosidase-1 OS=Mus musculus OX=10090 GN=Chit1 PI	0.972323	0	0	1.027677
P01741	>sp P01741 HVM00_MOUSE Ig heavy chain V region OS=Mus musculus OX=10090 PE=1	0.972118	0	0	1.027882
P60710	>sp P60710 ACTB_MOUSE Actin, cytoplasmic 1 OS=Mus musculus OX=10090 GN=Actb P	0.971304	0	1.028696	0
Q9JHR7	>sp Q9JHR7 IDE_MOUSE Insulin-degrading enzyme OS=Mus musculus OX=10090 GN=Id	0.967352	0	0	1.032648
Q9JI91	>sp Q9JI91 ACTN2_MOUSE Alpha-actinin-2 OS=Mus musculus OX=10090 GN=Actn2 PE=	0.960078	0.913386	0	1.126536
O35350	>sp O35350 CAN1_MOUSE Calpain-1 catalytic subunit OS=Mus musculus OX=10090 GN=	0.952142	0	0	1.047858

P08249	>sp P08249 MDHM_MOUSE Malate dehydrogenase, mitochondrial OS=Mus musculus O	0.950853	0	0.979085	1.070062
Q9EQU5	>sp Q9EQU5 SET_MOUSE Protein SET OS=Mus musculus OX=10090 GN=Set PE=1 SV=1	0.946634	1.053366	0	0
Q9QXT0	>sp Q9QXT0 CNPY2_MOUSE Protein canopy homolog 2 OS=Mus musculus OX=10090 G	0.945353	0.3319	0.10325	2.619496
P56565	>sp P56565 S10A1_MOUSE Protein S100-A1 OS=Mus musculus OX=10090 GN=S100a1 P	0.945063	0.258893	0	1.796044
Q00519	>sp Q00519 XDH_MOUSE Xanthine dehydrogenase/oxidase OS=Mus musculus OX=1009	0.943886	0	0	1.056114
Q9DCJ9	>sp Q9DCJ9 NPL_MOUSE N-acetylneuraminate lyase OS=Mus musculus OX=10090 GN=	0.940212	0	0	1.059788
P01631	>sp P01631 KV2A7_MOUSE Ig kappa chain V-II region 26-10 OS=Mus musculus OX=1009	0.937393	0	0	1.062607
Q9R0Y5	>sp Q9R0Y5 KAD1_MOUSE Adenylate kinase isoenzyme 1 OS=Mus musculus OX=10090	0.936	1.064	0	0
P48678	>sp P48678 LMNA_MOUSE Prelamin-A/C OS=Mus musculus OX=10090 GN=Lmna PE=1 !	0.934266	1.218003	0.113552	1.734179
P37804	>sp P37804 TAGL_MOUSE Transgelin OS=Mus musculus OX=10090 GN=Tagln PE=1 SV=3	0.931349	0	0	1.068651
P01797	>sp P01797 HVM28_MOUSE Ig heavy chain V-III region U61 OS=Mus musculus OX=1009	0.93085	0	0	1.06915
P68369	>sp P68369 TBA1A_MOUSE Tubulin alpha-1A chain OS=Mus musculus OX=10090 GN=Tu	0.928634	1.071366	0	0
O70435	>sp O70435 PSA3_MOUSE Proteasome subunit alpha type-3 OS=Mus musculus OX=100	0.927399	0	0	1.072601
Q8K183	>sp Q8K183 PDXK_MOUSE Pyridoxal kinase OS=Mus musculus OX=10090 GN=Pdxk PE=1	0.919937	0	1.291473	0.78859
P03987	>sp P03987 IGHG3_MOUSE Ig gamma-3 chain C region OS=Mus musculus OX=10090 PE	0.919286	0	0	1.080714
P48428	>sp P48428 TBCA_MOUSE Tubulin-specific chaperone A OS=Mus musculus OX=10090 G	0.914791	0.753765	1.331444	0
P20060	>sp P20060 HEXB_MOUSE Beta-hexosaminidase subunit beta OS=Mus musculus OX=10	0.899466	0	0.364739	1.735795
P50247	>sp P50247 SAHH_MOUSE Adenosylhomocysteinase OS=Mus musculus OX=10090 GN=	0.899261	0	0.057774	2.042965
Q01279	>sp Q01279 EGFR_MOUSE Epidermal growth factor receptor OS=Mus musculus OX=100	0.89096	0	1.10904	0
P56567	>sp P56567 CYTA_MOUSE Cystatin-A OS=Mus musculus OX=10090 GN=Csta PE=3 SV=1	0.888042	0.590013	0.198015	2.32393
O70456	>sp O70456 1433S_MOUSE 14-3-3 protein sigma OS=Mus musculus OX=10090 GN=Sfn	0.887754	0.121556	0	1.99069
P21765	>sp P21765 GPX5_MOUSE Epididymal secretory glutathione peroxidase OS=Mus muscu	0.887493	0	1.112507	0
Q61646	>sp Q61646 HPT_MOUSE Haptoglobin OS=Mus musculus OX=10090 GN=Hp PE=1 SV=1	0.88524	0	0.047544	2.067215
Q9D6Y7	>sp Q9D6Y7 MSRA_MOUSE Mitochondrial peptide methionine sulfoxide reductase OS=	0.88001	0	0	1.11999
Q8VDM4	>sp Q8VDM4 PSMD2_MOUSE 26S proteasome non-ATPase regulatory subunit 2 OS=Mu	0.879955	1.120045	0	0
P10518	>sp P10518 HEM2_MOUSE Delta-aminolevulinic acid dehydratase OS=Mus musculus OX	0.879679	0	0.51328	1.607041
Q03401	>sp Q03401 CRIS1_MOUSE Cysteine-rich secretory protein 1 OS=Mus musculus OX=100	0.877802	0	0	1.122198
P70349	>sp P70349 HINT1_MOUSE Histidine triad nucleotide-binding protein 1 OS=Mus muscu	0.874905	1.125095	0	0
Q9JKR6	>sp Q9JKR6 HYOU1_MOUSE Hypoxia up-regulated protein 1 OS=Mus musculus OX=100	0.87221	0.537535	0	1.590256
P54728	>sp P54728 RD23B_MOUSE UV excision repair protein RAD23 homolog B OS=Mus musc	0.862413	0	1.137587	0
P09405	>sp P09405 NUCL_MOUSE Nucleolin OS=Mus musculus OX=10090 GN=Ncl PE=1 SV=2	0.859324	0.153708	0.165796	2.821172
P19221	>sp P19221 THRB_MOUSE Prothrombin OS=Mus musculus OX=10090 GN=F2 PE=1 SV=1	0.856211	0	0	1.143789
Q9DBJ1	>sp Q9DBJ1 PGAM1_MOUSE Phosphoglycerate mutase 1 OS=Mus musculus OX=10090	0.854851	0	0.194308	1.950841
E9PV24	>sp E9PV24 FIBA_MOUSE Fibrinogen alpha chain OS=Mus musculus OX=10090 GN=Fga	0.853864	0.518052	0.267466	2.360618
Q9D967	>sp Q9D967 MGDP1_MOUSE Magnesium-dependent phosphatase 1 OS=Mus musculus	0.841285	0	0.385919	1.772796
Q9D832	>sp Q9D832 DNJB4_MOUSE DnaJ homolog subfamily B member 4 OS=Mus musculus OX	0.831209	0	0	1.168791
Q62059	>sp Q62059 CSPG2_MOUSE Versican core protein OS=Mus musculus OX=10090 GN=Vca	0.828274	0	0	1.171726
A2AEP0	>sp A2AEP0 OBP1B_MOUSE Odorant-binding protein 1b OS=Mus musculus OX=10090 G	0.825625	0	0.506772	1.667603
Q9CQF3	>sp Q9CQF3 CPSF5_MOUSE Cleavage and polyadenylation specificity factor subunit 5 O	0.824982	0	0	1.175018
P35505	>sp P35505 FAAA_MOUSE Fumarylacetoacetase OS=Mus musculus OX=10090 GN=Fah	0.823608	0	0.267291	1.909101
P22599	>sp P22599 A1AT2_MOUSE Alpha-1-antitrypsin 1-2 OS=Mus musculus OX=10090 GN=Se	0.817641	0	0.027564	2.154795
P09581	>sp P09581 CSF1R_MOUSE Macrophage colony-stimulating factor 1 receptor OS=Mus r	0.806791	0	0	1.193209
P01867	>sp P01867 IGG2B_MOUSE Ig gamma-2B chain C region OS=Mus musculus OX=10090 G	0.797718	0	0	1.202282
P20152	>sp P20152 VIME_MOUSE Vimentin OS=Mus musculus OX=10090 GN=Vim PE=1 SV=3	0.797699	1.081347	0	1.120954
Q5DU05	>sp Q5DU05 CE164_MOUSE Centrosomal protein of 164 kDa OS=Mus musculus OX=100	0.79091	0.299257	1.909833	0
P08074	>sp P08074 CBR2_MOUSE Carbonyl reductase [NADPH] 2 OS=Mus musculus OX=10090	0.787592	0	1.212408	0
P01898	>sp P01898 HA10_MOUSE H-2 class I histocompatibility antigen, Q10 alpha chain OS=M	0.785652	0	0	1.214348
Q497V5	>sp Q497V5 SRBD1_MOUSE S1 RNA-binding domain-containing protein 1 OS=Mus musc	0.782882	0	0	1.217118
Q99P72	>sp Q99P72 RTN4_MOUSE Reticulon-4 OS=Mus musculus OX=10090 GN=Rtn4 PE=1 SV=	0.773891	1.226109	0	0
P35564	>sp P35564 CALX_MOUSE Calnexin OS=Mus musculus OX=10090 GN=Canx PE=1 SV=1	0.773129	1.248578	0	0.978292
P97493	>sp P97493 THIOM_MOUSE Thioredoxin, mitochondrial OS=Mus musculus OX=10090 G	0.767546	0	0	1.232454
Q9QYJ3	>sp Q9QYJ3 DNJB1_MOUSE DnaJ homolog subfamily B member 1 OS=Mus musculus OX	0.763327	0	0	1.236673
P16546	>sp P16546 SPTN1_MOUSE Spectrin alpha chain, non-erythrocytic 1 OS=Mus musculu	0.761218	0.117247	0	2.121535
Q8R016	>sp Q8R016 BLMH_MOUSE Bleomycin hydrolase OS=Mus musculus OX=10090 GN=Blml	0.75807	0	0	1.24193
Q9QUM9	>sp Q9QUM9 PSA6_MOUSE Proteasome subunit alpha type-6 OS=Mus musculus OX=10	0.754124	0	0	1.245876
Q3UEB3	>sp Q3UEB3 PUF60_MOUSE Poly(U)-binding-splicing factor PUF60 OS=Mus musculus O	0.746168	0	0	1.253832
P57780	>sp P57780 ACTN4_MOUSE Alpha-actinin-4 OS=Mus musculus OX=10090 GN=Actn4 PE=	0.745295	0.278737	0	1.975968
P05063	>sp P05063 ALDOC_MOUSE Fructose-bisphosphate aldolase C OS=Mus musculus OX=10	0.741303	1.258697	0	0
P17047	>sp P17047 LAMP2_MOUSE Lysosome-associated membrane glycoprotein 2 OS=Mus m	0.729332	0.022545	0.535191	2.712932
P26369	>sp P26369 U2AF2_MOUSE Splicing factor U2AF 65 kDa subunit OS=Mus musculus OX=	0.720754	0	0	1.279246
P10711	>sp P10711 TCEA1_MOUSE Transcription elongation factor A protein 1 OS=Mus muscul	0.708744	0.171567	0	2.119689

Q9CYR0	>sp Q9CYR0 SSBP_MOUSE Single-stranded DNA-binding protein, mitochondrial OS=Mus	0.70614	0	0	1.29386
Q9ESB3	>sp Q9ESB3 HRG_MOUSE Histidine-rich glycoprotein OS=Mus musculus OX=10090 GN=I	0.70465	0	0	1.29535
Q80VP2	>sp Q80VP2 SPAT7_MOUSE Spermatogenesis-associated protein 7 homolog OS=Mus m	0.702306	0	1.297694	0
P27546	>sp P27546 MAP4_MOUSE Microtubule-associated protein 4 OS=Mus musculus OX=100	0.702181	1.297819	0	0
O08553	>sp O08553 DPYL2_MOUSE Dihydropyrimidinase-related protein 2 OS=Mus musculus O	0.700211	0	0	1.299789
Q9DBG9	>sp Q9DBG9 TX1B3_MOUSE Tax1-binding protein 3 OS=Mus musculus OX=10090 GN=T	0.694755	0	0	1.305245
Q8R429	>sp Q8R429 AT2A1_MOUSE Sarcoplasmic/endoplasmic reticulum calcium ATPase 1 OS=	0.688561	1.311439	0	0
Q9CPV4	>sp Q9CPV4 GLOD4_MOUSE Glyoxalase domain-containing protein 4 OS=Mus musculus	0.688007	0	0	1.311993
Q9D3H2	>sp Q9D3H2 OBP1A_MOUSE Odorant-binding protein 1a OS=Mus musculus OX=10090 (	0.686637	0	1.576345	0.737017
Q9D6P8	>sp Q9D6P8 CALL3_MOUSE Calmodulin-like protein 3 OS=Mus musculus OX=10090 GN=	0.685846	0.40001	0.171091	2.743053
P11352	>sp P11352 GPX1_MOUSE Glutathione peroxidase 1 OS=Mus musculus OX=10090 GN=C	0.678345	0	0.103489	2.218167
Q91VE3	>sp Q91VE3 KLK7_MOUSE Kallikrein-7 OS=Mus musculus OX=10090 GN=Klk7 PE=1 SV=1	0.667626	0	0	1.332374
Q9Z247	>sp Q9Z247 FKBP9_MOUSE Peptidyl-prolyl cis-trans isomerase FKBP9 OS=Mus musculus	0.659089	0	0	1.340911
Q9WUU7	>sp Q9WUU7 CATZ_MOUSE Cathepsin Z OS=Mus musculus OX=10090 GN=Ctsz PE=1 SV	0.649218	0	0.724491	1.62629
Q61398	>sp Q61398 PCOC1_MOUSE Procollagen C-endopeptidase enhancer 1 OS=Mus musculu	0.645351	0	0	1.354649
P97425	>sp P97425 ECP2_MOUSE Eosinophil cationic protein 2 OS=Mus musculus OX=10090 GN	0.632051	0	0.176766	2.191183
Q8VCM7	>sp Q8VCM7 FIBG_MOUSE Fibrinogen gamma chain OS=Mus musculus OX=10090 GN=F	0.625652	0.313679	0	2.060669
P97449	>sp P97449 AMPN_MOUSE Aminopeptidase N OS=Mus musculus OX=10090 GN=Anpep	0.612427	1.387573	0	0
Q61081	>sp Q61081 CDC37_MOUSE Hsp90 co-chaperone Cdc37 OS=Mus musculus OX=10090 G	0.612399	1.387601	0	0
Q640N1	>sp Q640N1 AEBP1_MOUSE Adipocyte enhancer-binding protein 1 OS=Mus musculus O	0.609846	0	0	1.390154
P62908	>sp P62908 RS3_MOUSE 40S ribosomal protein S3 OS=Mus musculus OX=10090 GN=Rp	0.584358	1.415642	0	0
O54724	>sp O54724 CAVN1_MOUSE Caveolae-associated protein 1 OS=Mus musculus OX=1009	0.579244	1.420756	0	0
Q9EPB4	>sp Q9EPB4 ASC_MOUSE Apoptosis-associated speck-like protein containing a CARD OS	0.576452	0.312672	0	2.110876
Q9JKB3	>sp Q9JKB3 YBOX3_MOUSE Y-box-binding protein 3 OS=Mus musculus OX=10090 GN=Y	0.571872	1.428128	0	0
P35175	>sp P35175 CYT1_MOUSE Stefin-1 OS=Mus musculus OX=10090 GN=Stfa1 PE=3 SV=1	0.565842	0	0.068481	2.365677
Q64010	>sp Q64010 CRK_MOUSE Adapter molecule crk OS=Mus musculus OX=10090 GN=Crk PE	0.552734	0	0	1.447266
Q03265	>sp Q03265 ATPA_MOUSE ATP synthase subunit alpha, mitochondrial OS=Mus musculu	0.55058	1.44942	0	0
Q9R269	>sp Q9R269 PEPL_MOUSE Periplakin OS=Mus musculus OX=10090 GN=Ppl PE=1 SV=1	0.550193	0.843272	0	1.606536
Q8C6C9	>sp Q8C6C9 LEG1H_MOUSE Protein LEG1 homolog OS=Mus musculus OX=10090 GN=Le	0.543983	0	0	1.456017
P01831	>sp P01831 THY1_MOUSE Thy-1 membrane glycoprotein OS=Mus musculus OX=10090 (	0.535822	0	0	1.464178
Q62261	>sp Q62261 SPTB2_MOUSE Spectrin beta chain, non-erythrocytic 1 OS=Mus musculus O	0.531678	0.57734	0	1.890982
Q8CIT9	>sp Q8CIT9 SBSN_MOUSE Suprabasin OS=Mus musculus OX=10090 GN=Sbsn PE=2 SV=1	0.517315	1.482685	0	0
P60840	>sp P60840 ENSA_MOUSE Alpha-endosulfine OS=Mus musculus OX=10090 GN=Ensa PE	0.513633	0	0	1.486367
O35215	>sp O35215 DOPD_MOUSE D-dopachrome decarboxylase OS=Mus musculus OX=10090	0.51233	0	1.860933	0.626736
P0DP28	>sp P0DP28 CALM3_MOUSE Calmodulin-3 OS=Mus musculus OX=10090 GN=Calm3 PE=	0.49634	0.229934	0	2.273727
P02469	>sp P02469 LAMB1_MOUSE Laminin subunit beta-1 OS=Mus musculus OX=10090 GN=L	0.490516	1.366569	0	1.142914
P07758	>sp P07758 A1AT1_MOUSE Alpha-1-antitrypsin 1-1 OS=Mus musculus OX=10090 GN=Se	0.487087	0	0	1.512913
P00920	>sp P00920 CAH2_MOUSE Carbonic anhydrase 2 OS=Mus musculus OX=10090 GN=Ca2	0.47977	0.120797	0.083266	3.316167
Q9R1P3	>sp Q9R1P3 PSB2_MOUSE Proteasome subunit beta type-2 OS=Mus musculus OX=1009	0.477747	0	0	1.522253
Q7TMK6	>sp Q7TMK6 HOOK2_MOUSE Protein Hook homolog 2 OS=Mus musculus OX=10090 GN	0.477721	0	0	1.522279
Q61129	>sp Q61129 CFAI_MOUSE Complement factor I OS=Mus musculus OX=10090 GN=Cfi PE	0.475274	0	0.266447	2.258279
Q6IRU2	>sp Q6IRU2 TPM4_MOUSE Tropomyosin alpha-4 chain OS=Mus musculus OX=10090 GN	0.474634	0.155476	0.058276	3.311614
P62984	>sp P62984 RL40_MOUSE Ubiquitin-60S ribosomal protein L40 OS=Mus musculus OX=10	0.473375	0.56343	0	1.963195
P23492	>sp P23492 PNPH_MOUSE Purine nucleoside phosphorylase OS=Mus musculus OX=100	0.464897	0	0.141395	2.393707
P62897	>sp P62897 CYC_MOUSE Cytochrome c, somatic OS=Mus musculus OX=10090 GN=Cycs	0.458171	0	0.281545	2.260284
Q91YR9	>sp Q91YR9 PTGR1_MOUSE Prostaglandin reductase 1 OS=Mus musculus OX=10090 GN	0.454761	0	0	1.545239
P53026	>sp P53026 RL10A_MOUSE 60S ribosomal protein L10a OS=Mus musculus OX=10090 GN	0.446095	1.46435	0	1.089554
P29788	>sp P29788 VTNC_MOUSE Vitronectin OS=Mus musculus OX=10090 GN=Vtn PE=1 SV=2	0.428542	0	0	1.571458
P01029	>sp P01029 CO4B_MOUSE Complement C4-B OS=Mus musculus OX=10090 GN=C4b PE=	0.426955	0	0	1.573045
Q8BFS6	>sp Q8BFS6 CPPED_MOUSE Serine/threonine-protein phosphatase CPPED1 OS=Mus mu	0.425412	0	1.574588	0
P31428	>sp P31428 DPEP1_MOUSE Dipeptidase 1 OS=Mus musculus OX=10090 GN=Dpep1 PE=	0.423179	0.534141	0	2.042681
P56812	>sp P56812 PDCD5_MOUSE Programmed cell death protein 5 OS=Mus musculus OX=100	0.419474	1.500587	1.079939	0
P28654	>sp P28654 PGS2_MOUSE Decorin OS=Mus musculus OX=10090 GN=Dcn PE=1 SV=1	0.411205	1.588795	0	0
Q99LS3	>sp Q99LS3 SERB_MOUSE Phosphoserine phosphatase OS=Mus musculus OX=10090 GN	0.409945	0	0	1.590055
Q9D1Q6	>sp Q9D1Q6 ERP44_MOUSE Endoplasmic reticulum resident protein 44 OS=Mus muscu	0.380567	0	0	1.619433
P14602	>sp P14602 HSPB1_MOUSE Heat shock protein beta-1 OS=Mus musculus OX=10090 GN	0.375426	0.029367	0	2.595207
P21460	>sp P21460 CYTC_MOUSE Cystatin-C OS=Mus musculus OX=10090 GN=Cst3 PE=1 SV=2	0.373275	0	0.516546	2.110179
P30412	>sp P30412 PPIC_MOUSE Peptidyl-prolyl cis-trans isomerase C OS=Mus musculus OX=10	0.371581	0.082097	2.098269	1.448054
O89020	>sp O89020 AFAM_MOUSE Afamin OS=Mus musculus OX=10090 GN=Afm PE=1 SV=2	0.368275	0	1.870243	0.761482
P26883	>sp P26883 FKB1A_MOUSE Peptidyl-prolyl cis-trans isomerase FKBP1A OS=Mus muscul	0.363409	0	2.085633	0.550958
P20108	>sp P20108 PRDX3_MOUSE Thioredoxin-dependent peroxide reductase, mitochondrial (	0.363198	0	0	1.636802

Q8BTM8	>sp Q8BTM8 FLNA_MOUSE Filamin-A OS=Mus musculus OX=10090 GN=Flna PE=1 SV=5	0.360969	0	0	1.639031
P24369	>sp P24369 PPIB_MOUSE Peptidyl-prolyl cis-trans isomerase B OS=Mus musculus OX=10090 GN=PpiB PE=1 SV=5	0.347815	0.083638	1.035625	2.532922
Q80XU3	>sp Q80XU3 NUCKS_MOUSE Nuclear ubiquitous casein and cyclin-dependent kinase subunit 1 OS=Mus musculus OX=10090 GN=Nuck1 PE=1 SV=5	0.337086	0	1.040899	1.622015
Q61545	>sp Q61545 EWS_MOUSE RNA-binding protein EWS OS=Mus musculus OX=10090 GN=Ewsr1 PE=1 SV=5	0.325298	0	0.588875	2.085828
Q2VIS4	>sp Q2VIS4 FILA2_MOUSE Filaggrin-2 OS=Mus musculus OX=10090 GN=Flg2 PE=1 SV=2	0.318103	2.294982	0	0.386915
P97457	>sp P97457 MLRS_MOUSE Myosin regulatory light chain 2, skeletal muscle isoform OS=Mus musculus OX=10090 GN=Myh11 PE=1 SV=5	0.308902	1.691098	0	0
P0CG50	>sp P0CG50 UBC_MOUSE Polyubiquitin-C OS=Mus musculus OX=10090 GN=Ubc PE=1 SV=5	0.297474	0	0.555129	2.147396
O08638	>sp O08638 MYH11_MOUSE Myosin-11 OS=Mus musculus OX=10090 GN=Myh11 PE=1 SV=5	0.27794	1.72206	0	0
P15532	>sp P15532 NDKA_MOUSE Nucleoside diphosphate kinase A OS=Mus musculus OX=10090 GN=NdkA PE=1 SV=5	0.260943	0.121169	0.021784	3.596104
P10107	>sp P10107 ANXA1_MOUSE Annexin A1 OS=Mus musculus OX=10090 GN=Anxa1 PE=1 SV=5	0.236868	1.763132	0	0
Q9CYW4	>sp Q9CYW4 HDHD3_MOUSE Haloacid dehalogenase-like hydrolase domain-containing protein 3 OS=Mus musculus OX=10090 GN=Hdhd3 PE=1 SV=5	0.225514	0	0	1.774486
Q9D6J6	>sp Q9D6J6 NDUV2_MOUSE NADH dehydrogenase [ubiquinone] flavoprotein 2, mitochondrial OS=Mus musculus OX=10090 GN=Nduv2 PE=1 SV=5	0.222252	0.1963	0	2.581449
Q9JI02	>sp Q9JI02 S2B20_MOUSE Secretoglobin family 2B member 20 OS=Mus musculus OX=10090 GN=S2b20 PE=1 SV=5	0.210567	0.597927	0.844	2.347506
Q9D154	>sp Q9D154 ILEUA_MOUSE Leukocyte elastase inhibitor A OS=Mus musculus OX=10090 GN=Ileua PE=1 SV=5	0.205964	0	0.586285	2.207752
P08121	>sp P08121 CO3A1_MOUSE Collagen alpha-1(III) chain OS=Mus musculus OX=10090 GN=Col3a1 PE=1 SV=5	0.203656	2.147252	0.252584	1.396509
P50446	>sp P50446 K2C6A_MOUSE Keratin, type II cytoskeletal 6A OS=Mus musculus OX=10090 GN=K2c6a PE=1 SV=5	0.201666	1.705557	0	1.092777
P05202	>sp P05202 AATM_MOUSE Aspartate aminotransferase, mitochondrial OS=Mus musculus OX=10090 GN=Aatm PE=1 SV=5	0.201373	0	0	1.798627
P07361	>sp P07361 A1AG2_MOUSE Alpha-1-acid glycoprotein 2 OS=Mus musculus OX=10090 GN=A1ag2 PE=1 SV=5	0.198187	0.028904	0	2.772909
P62315	>sp P62315 SMD1_MOUSE Small nuclear ribonucleoprotein Sm D1 OS=Mus musculus OX=10090 GN=Smd1 PE=1 SV=5	0.194575	0	0	1.805425
Q01149	>sp Q01149 CO1A2_MOUSE Collagen alpha-2(I) chain OS=Mus musculus OX=10090 GN=Col1a2 PE=1 SV=5	0.161146	3.278124	0.316517	0.244213
P18761	>sp P18761 CAH6_MOUSE Carbonic anhydrase 6 OS=Mus musculus OX=10090 GN=Ca6 PE=1 SV=5	0.158303	0	0.053984	2.787712
P11087	>sp P11087 CO1A1_MOUSE Collagen alpha-1(I) chain OS=Mus musculus OX=10090 GN=Col1a1 PE=1 SV=5	0.142439	3.580676	0.110303	0.166583
Q5SX39	>sp Q5SX39 MYH4_MOUSE Myosin-4 OS=Mus musculus OX=10090 GN=Myh4 PE=2 SV=5	0.127397	3.75955	0.045818	0.067235
Q8VCI0	>sp Q8VCI0 PLBL1_MOUSE Phospholipase B-like 1 OS=Mus musculus OX=10090 GN=Plb1 PE=1 SV=5	0.108258	0.064401	0.105247	3.722093
Q9D1E6	>sp Q9D1E6 TBCB_MOUSE Tubulin-folding cofactor B OS=Mus musculus OX=10090 GN=Tbc1b PE=1 SV=5	0.098876	0	0	1.901124
Q922U2	>sp Q922U2 K2C5_MOUSE Keratin, type II cytoskeletal 5 OS=Mus musculus OX=10090 GN=K2c5 PE=1 SV=5	0.094056	3.342814	0.010945	0.552185
P45878	>sp P45878 FKBP2_MOUSE Peptidyl-prolyl cis-trans isomerase FKBP2 OS=Mus musculus OX=10090 GN=Fkbp2 PE=1 SV=5	0.090277	0	1.319192	1.59053
P62307	>sp P62307 RUXF_MOUSE Small nuclear ribonucleoprotein F OS=Mus musculus OX=10090 GN=Ruxf PE=1 SV=5	0.071752	0	0	1.928248
P00687	>sp P00687 AMY1_MOUSE Alpha-amylase 1 OS=Mus musculus OX=10090 GN=Amy1 PE=1 SV=5	0.064401	0	0.08827	2.847329
O08583	>sp O08583 THOC4_MOUSE THO complex subunit 4 OS=Mus musculus OX=10090 GN=Thoc4 PE=1 SV=5	0.062569	0	0	1.937431
Q5SX40	>sp Q5SX40 MYH1_MOUSE Myosin-1 OS=Mus musculus OX=10090 GN=Myh1 PE=1 SV=5	0.04315	1.445043	0	1.511807
Q9ERG0	>sp Q9ERG0 LIMA1_MOUSE LIM domain and actin-binding protein 1 OS=Mus musculus OX=10090 GN=Lima1 PE=1 SV=5	0.030152	1.969848	0	0
P35173	>sp P35173 CYT3_MOUSE Stefin-3 OS=Mus musculus OX=10090 GN=Stfa3 PE=3 SV=1	0.018362	0.00621	0.309291	3.666137
P97861	>sp P97861 KRT86_MOUSE Keratin, type II cuticular Hb6 OS=Mus musculus OX=10090 GN=Krt86 PE=1 SV=5	0	1.994793	0.005207	0
Q8VED5	>sp Q8VED5 K2C79_MOUSE Keratin, type II cytoskeletal 79 OS=Mus musculus OX=10090 GN=K2c79 PE=1 SV=5	0	1.984263	0.015737	0
P11088	>sp P11088 FILA_MOUSE Filaggrin (Fragment) OS=Mus musculus OX=10090 GN=Flg PE=1 SV=5	0	1.916764	0.083236	0
P02535	>sp P02535 K1C10_MOUSE Keratin, type I cytoskeletal 10 OS=Mus musculus OX=10090 GN=K1c10 PE=1 SV=5	0	1.896699	0.103301	0
O54974	>sp O54974 LEG7_MOUSE Galectin-7 OS=Mus musculus OX=10090 GN=Lgals7 PE=2 SV=5	0	1.560537	0.439463	0
A2A791	>sp A2A791 ZMYM4_MOUSE Zinc finger MYM-type protein 4 OS=Mus musculus OX=10090 GN=Zmy4 PE=1 SV=5	0	1.252781	0.747219	0
O54962	>sp O54962 BAF_MOUSE Barrier-to-autointegration factor OS=Mus musculus OX=10090 GN=Baf1 PE=1 SV=5	0	1.15203	0.84797	0
Q8C2S7	>sp Q8C2S7 AMGO3_MOUSE Amphoterin-induced protein 3 OS=Mus musculus OX=10090 GN=Amgo3 PE=1 SV=5	0	1.057167	0.942833	0
Q00896	>sp Q00896 A1AT3_MOUSE Alpha-1-antitrypsin 1-3 OS=Mus musculus OX=10090 GN=A1at3 PE=1 SV=5	0	1.037477	0.962523	0
Q62504	>sp Q62504 MINT_MOUSE Msx2-interacting protein OS=Mus musculus OX=10090 GN=Mint1 PE=1 SV=5	0	1.009009	0.990991	0
Q3UGF1	>sp Q3UGF1 WDR19_MOUSE WD repeat-containing protein 19 OS=Mus musculus OX=10090 GN=Wdr19 PE=1 SV=5	0	0.931531	1.068469	0
Q00609	>sp Q00609 CD80_MOUSE T-lymphocyte activation antigen CD80 OS=Mus musculus OX=10090 GN=Cd80 PE=1 SV=5	0	0.889421	1.110579	0
P12710	>sp P12710 FABPL_MOUSE Fatty acid-binding protein, liver OS=Mus musculus OX=10090 GN=Fabpl PE=1 SV=5	0	0.879953	1.120047	0
P09036	>sp P09036 ISK1_MOUSE Serine protease inhibitor Kazal-type 1 OS=Mus musculus OX=10090 GN=Isk1 PE=1 SV=5	0	0.805981	1.194019	0
Q91VF5	>sp Q91VF5 EMID1_MOUSE EMI domain-containing protein 1 OS=Mus musculus OX=10090 GN=Emid1 PE=1 SV=5	0	0.661373	1.338627	0
Q9D1G1	>sp Q9D1G1 RAB1B_MOUSE Ras-related protein Rab-1B OS=Mus musculus OX=10090 GN=Rab1b PE=1 SV=5	0	0.650974	1.349026	0
Q60590	>sp Q60590 A1AG1_MOUSE Alpha-1-acid glycoprotein 1 OS=Mus musculus OX=10090 GN=A1ag1 PE=1 SV=5	0	0.602544	1.397456	0
Q9QWL7	>sp Q9QWL7 K1C17_MOUSE Keratin, type I cytoskeletal 17 OS=Mus musculus OX=10090 GN=K1c17 PE=1 SV=5	0	2.948817	0.027384	0.023799
P07356	>sp P07356 ANXA2_MOUSE Annexin A2 OS=Mus musculus OX=10090 GN=Anxa2 PE=1 SV=5	0	1.891805	0	0.108195
Q9R0H5	>sp Q9R0H5 K2C71_MOUSE Keratin, type II cytoskeletal 71 OS=Mus musculus OX=10090 GN=K2c71 PE=1 SV=5	0	1.84165	0	0.15835
P08122	>sp P08122 CO4A2_MOUSE Collagen alpha-2(IV) chain OS=Mus musculus OX=10090 GN=Col4a2 PE=1 SV=5	0	1.816044	0	0.183956
P04104	>sp P04104 K2C1_MOUSE Keratin, type II cytoskeletal 1 OS=Mus musculus OX=10090 GN=K2c1 PE=1 SV=5	0	2.447923	0.204175	0.347902
Q8VDD5	>sp Q8VDD5 MYH9_MOUSE Myosin-9 OS=Mus musculus OX=10090 GN=Myh9 PE=1 SV=5	0	1.653278	0.922951	0.423771
O88668	>sp O88668 CREG1_MOUSE Protein CREG1 OS=Mus musculus OX=10090 GN=Creg1 PE=1 SV=5	0	0	1.362315	0.637685
Q61781	>sp Q61781 K1C14_MOUSE Keratin, type I cytoskeletal 14 OS=Mus musculus OX=10090 GN=K1c14 PE=1 SV=5	0	2.114305	0.009072	0.876624
P19001	>sp P19001 K1C19_MOUSE Keratin, type I cytoskeletal 19 OS=Mus musculus OX=10090 GN=K1c19 PE=1 SV=5	0	1.061736	0	0.938264
P02468	>sp P02468 LAMC1_MOUSE Laminin subunit gamma-1 OS=Mus musculus OX=10090 GN=Lamc1 PE=1 SV=5	0	0.918567	0	1.081433
P11276	>sp P11276 FINC_MOUSE Fibronectin OS=Mus musculus OX=10090 GN=Fn1 PE=1 SV=4	0	0.898356	0	1.101644

P11438	>sp P11438 LAMP1_MOUSE Lysosome-associated membrane glycoprotein 1 OS=Mus m	0	0	0.769609	1.230391
P26043	>sp P26043 RADI_MOUSE Radixin OS=Mus musculus OX=10090 GN=Rdx PE=1 SV=3	0	0.760722	0	1.239278
P20918	>sp P20918 PLMN_MOUSE Plasminogen OS=Mus musculus OX=10090 GN=Plg PE=1 SV=	0	0	0.653053	1.346947
Q9D114	>sp Q9D114 MESH1_MOUSE Guanosine-3',5'-bis(diphosphate) 3'-pyrophosphohydrolas	0	0	0.570647	1.429353
Q99L45	>sp Q99L45 IF2B_MOUSE Eukaryotic translation initiation factor 2 subunit 2 OS=Mus m	0	0.565484	0	1.434516
P36369	>sp P36369 K1B26_MOUSE Kallikrein 1-related peptidase b26 OS=Mus musculus OX=10	0	0	0.466408	1.533592
E9Q5C9	>sp E9Q5C9 NOLC1_MOUSE Nucleolar and coiled-body phosphoprotein 1 OS=Mus musc	0	0	0.409475	1.590525
Q8BFU2	>sp Q8BFU2 H2A3_MOUSE Histone H2A type 3 OS=Mus musculus OX=10090 GN=Hist3h	0	0.399916	0	1.600084
P62818	>sp P62818 S10A3_MOUSE Protein S100-A3 OS=Mus musculus OX=10090 GN=S100a3 P	0	0.375778	0	1.624222
Q07797	>sp Q07797 LG3BP_MOUSE Galectin-3-binding protein OS=Mus musculus OX=10090 GN	0	0.326846	0	1.673154
Q3TYQ9	>sp Q3TYQ9 AOXD_MOUSE Aldehyde oxidase 4 OS=Mus musculus OX=10090 GN=Aox4	0	0	0.30102	1.69898
Q06318	>sp Q06318 UTER_MOUSE Uteroglobin OS=Mus musculus OX=10090 GN=Scgb1a1 PE=1	0	0	0.281588	1.718412
P15947	>sp P15947 KLK1_MOUSE Kallikrein-1 OS=Mus musculus OX=10090 GN=Klk1 PE=1 SV=3	0	0	0.26411	1.73589
Q80X19	>sp Q80X19 COEA1_MOUSE Collagen alpha-1(XIV) chain OS=Mus musculus OX=10090 G	0	0.254545	0	1.745455
Q61207	>sp Q61207 SAP_MOUSE Prosaposin OS=Mus musculus OX=10090 GN=Psap PE=1 SV=2	0	0.234506	0	1.765494
Q8R3Q6	>sp Q8R3Q6 CCD58_MOUSE Coiled-coil domain-containing protein 58 OS=Mus musculu	0	0.211467	0	1.788533
P30681	>sp P30681 HMGB2_MOUSE High mobility group protein B2 OS=Mus musculus OX=100	0	0.208217	0	1.791783
Q9CQZ1	>sp Q9CQZ1 HSBP1_MOUSE Heat shock factor-binding protein 1 OS=Mus musculus OX=	0	0.182933	0	1.817067
Q9CZ44	>sp Q9CZ44 NSF1C_MOUSE NSF1 cofactor p47 OS=Mus musculus OX=10090 GN=Nsf1	0	0	0.157519	1.842481
Q91XA9	>sp Q91XA9 CHIA_MOUSE Acidic mammalian chitinase OS=Mus musculus OX=10090 GN	0	0	0.143723	1.856277
Q62093	>sp Q62093 SRSF2_MOUSE Serine/arginine-rich splicing factor 2 OS=Mus musculus OX=	0	0.954075	0.161319	1.884606
Q8K385	>sp Q8K385 FRRS1_MOUSE Ferric-chelate reductase 1 OS=Mus musculus OX=10090 GN	0	0	0.101444	1.898556
Q9D0R8	>sp Q9D0R8 LSM12_MOUSE Protein LSM12 homolog OS=Mus musculus OX=10090 GN=	0	0	0.083145	1.916855
P62806	>sp P62806 H4_MOUSE Histone H4 OS=Mus musculus OX=10090 GN=Hist1h4a PE=1 SV:	0	0.034887	0	1.965113
P32261	>sp P32261 ANT3_MOUSE Antithrombin-III OS=Mus musculus OX=10090 GN=Serpinc1 F	0	0.03121	0	1.96879
Q07456	>sp Q07456 AMBP_MOUSE Protein AMBP OS=Mus musculus OX=10090 GN=Ambp PE=1	0	0.167361	0.780208	2.052432
P18572	>sp P18572 BASI_MOUSE Basigin OS=Mus musculus OX=10090 GN=Bsg PE=1 SV=2	0	0.022468	0.70934	2.268192

SUPPLEMENTARY TABLE 2

Glycan modification

Peptide	Glycans	Modification Type(s)	Observed m/z	z	Mass error (ppm)	Score
Mouse 1						
R.AFVEN[+2908.985]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(3)	N[+2909]	1577.998	3	-0.1	123.7
R.AFVEN[+2601.895]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(2)	N[+2602]	1475.298	3	-1.8	124
R.AFVEN[+1929.672]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(1)	N[+1930]	1251.559	3	-1.3	161.1
R.AFVEN[+2236.762]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(2)	N[+2237]	1353.922	3	-1.6	305.5
Mouse 2						
R.AFVEN[+1564.540]ITVLENSLVFK.F	HexNAc(3)Hex(4)NeuGc(1)	N[+1565]	1129.848	3	-1.6	93.4
R.AFVEN[+2908.985]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(3)	N[+2909]	1577.996	3	-1.3	134.9
R.AFVEN[+2188.740]ITVLENSLVFK.F	HexNAc(2)Hex(11)	N[+2189]	1003.428	4	-10.1	225.2
R.AFVEN[+2236.762]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(2)	N[+2237]	1353.924	3	-0.3	328.5
R.AFVEN[+1929.672]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(1)	N[+1930]	1251.56	3	-0.3	329.9
Mouse 3						
R.AFVEN[+2908.985]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(3)	N[+2909]	1183.749	4	-0.8	88.3
R.AFVEN[+2585.900]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuAc(1)NeuGc(1)	N[+2586]	1103.209	4	-18.8	129.3
R.AFVEN[+2236.762]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(2)	N[+2237]	1353.924	3	0.3	176.3
Mouse 4						
R.AFVEN[+2220.767]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuAc(1)NeuGc(1)	N[+2221]	1348.593	3	0.6	421.9
R.AFVEN[+3258.122]ITVLENSLVFK.F	HexNAc(6)Hex(6)Fuc(1)NeuGc(3)	N[+3258]	1271.012	4	-17.7	174.9
R.AFVEN[+2908.985]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(3)	N[+2909]	1183.751	4	0.6	291.5
R.AFVEN[+1929.672]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(1)	N[+1930]	1251.562	3	1.3	298.2
R.AFVEN[+2236.762]ITVLENSLVFK.F	HexNAc(4)Hex(5)NeuGc(2)	N[+2237]	1015.695	4	-0.1	450.3
R.AFVEN[+2277.789]ITVLENSLVFK.F	HexNAc(5)Hex(4)NeuGc(2)	N[+2278]	1367.927	3	-4.8	124.5
R.AFVEN[+2601.895]ITVLENSLVFK.F	HexNAc(5)Hex(6)NeuGc(2)	N[+2602]	1475.295	3	-3.9	179.7
R.AFVEN[+1564.540]ITVLENSLVFK.F	HexNAc(3)Hex(4)NeuGc(1)	N[+1565]	1129.849	3	-0.9	78.6
R.AFVEN[+2237.783]ITVLENSLVFK.F	HexNAc(4)Hex(6)Fuc(1)NeuGc(1)	N[+2238]	1015.941	4	-9.2	196.5
R.AFVEN[+2221.788]ITVLENSLVFK.F	HexNAc(4)Hex(6)Fuc(1)NeuAc(1)	N[+2222]	1011.696	4	-3.8	238
R.AFVEN[+2910.005]ITVLENSLVFK.F	HexNAc(5)Hex(7)Fuc(1)NeuGc(2)	N[+2910]	1183.75	4	-4	4.8