| Supplementary table 1: Identified proteins in cytoplasmic fraction and their oligomerization |
|--|
| state according to the workflow represented in fig. 3. Proteins that we cannot resolve any   |
| oligomerization state for them are highlighted in gray.                                      |

| Gene<br>symbol | sample<br>number | ac. No. | score | Coverage % | Monomer | Homo<br>oligomer | Hetero oligomer               |
|----------------|------------------|---------|-------|------------|---------|------------------|-------------------------------|
| ECHS1          | CC004            | P30084  | 81    | 51         | -       | CPH1             | CPC15                         |
| GAPDH          | cc009            | P04406  | 327   |            | -       | -                | CPC7, CPC18,                  |
|                |                  |         |       | 34         |         |                  | CPC38                         |
| HSPE1          | CC011            | P61604  | 286   | 65         | -       | -                | CPC4                          |
| HSPD1          | CC017            | P10809  | 223   | 57         | -       | -                | CPC16, CPC24,<br>CPC26, CPC39 |
| ALDOA          | CC077            | P04075  | 126   | 88         | -       | CPH2             | CPC7, CPC36,<br>CPC37         |
| NME2           | CC092            | P22392  | 88    | 55         |         |                  |                               |
| GPI            | CC204            | P06744  | 128   | 35         | -       | -                | CPC19, CPC25                  |
| ATP5B          | CC205            | P06576  | 145   | 52         | -       | -                | CPC20, CPC21,<br>CPC24        |
| TUBA1C         | CC205            | Q9BQE3  | 75    | 42         | -       | -                | CPC21, CPC22                  |
| TUBB           | CC205            | P07437  | 95    | 47         | -       | -                | CPC23                         |
| ТКТ            | CC207            | P29401  | 175   | 50         | -       | CPH3             | CPC25, CPC40                  |
| PSMA1          | cc208            | P25786  | 59    | 30         | -       | -                | CPC35                         |
| PSMA7          | CC209            | O14818  | 146   | 71         | -       | -                | CPC35                         |
| KRT1           | CC210            | P04264  | 95    | 41         |         |                  |                               |
| PSMB1          | CC212            | P20618  | 80    | 61         | -       | -                | CPC35                         |
| PSMB2          | CC213            | P28074  | 102   | 72         | -       | -                | CPC35                         |
| NCL            | CC214            | P19338  | 282   | 21         |         |                  |                               |
| IMPDH2         | CC215            | P12268  | 116   | 40         | -       | -                | CPC40                         |
| TPI1           | CC216            | P60174  | 150   | 75         | -       | _                | CPC19, CPC20                  |
| LDHA           | CC217            | P00338  | 83    | 40         | -       | _                | CPC38                         |
| GNPDA1         | CC217            | P46926  | 93    | 68         |         |                  |                               |
| YWHAE          | CC218            | P62258  | 140   | 80         | -       | -                | CPC8                          |
| YWHAZ          | CC219            | P63104  | 101   | 41         | -       | _                | CPC8                          |
| CKB            | CC220            | P12277  | 69    | 30         | Monomer | _                | -                             |
| ANP32A         | CC223            | P39687  | 62    | 44         | Monomer | _                | -                             |
| PRDX6          | CC225            | P30041  | 127   | 62         | -       | CPH4             | -                             |
| KRT1           | CC226            | P04264  | 99    | 42         | _       | CPH5             | _                             |
| TAGLN          | CC227            | 001995  | 68    | 63         |         | 01110            |                               |
| SETED          | CC228            | P35247  | 67    | 66         | _       | CPH6             | -                             |
| SKP1           | cc220            | P63247  | 329   | 29         | _       | CPH7             | _                             |
| CALM1          | cc229            | P62158  | 282   | 36         | -       | СРНЯ             | -                             |
| SOD1           | cc229            | D00441  | 202   | 30<br>27   | -       | CI 110           | -<br>CPC10                    |
| DAN            | CC230            | P00441  | 200   | 27<br>50   | -       |                  | CrCl0                         |
| KAN<br>TDI 1   | CC252            | P02820  | 150   | 50         | -       | СРП9             | -                             |
| TON            | 022              | P00174  | 150   | 08         | -       | -                | CPC7, CPC36,<br>CPC37         |
| ISN            | cc233            | Q15631  | 280   | 43         |         |                  | CD CD C                       |
| PRDX1          | cc234            | Q06830  | 45    | 23         | -       | -                | CPC20                         |
| HIST1H2AG      | cc235            | P0C0S8  | 109   | 16         | -       | -                | -                             |
| PGAM1          | CC236            | P18669  | 136   | 78         | -       | CPH10            | CPC1                          |
| PFN1           | CC237            | P07737  | 62    | 50         |         |                  |                               |
| PFN1           | cc238            | P07737  | 315   | 57         | -       | CPH11            | -                             |

| Gene symbol | sample<br>number | ac. No. | score | Coverage<br>% | Monomer | Homo<br>oligomer | Hetero oligomer     |
|-------------|------------------|---------|-------|---------------|---------|------------------|---------------------|
| Fkbp1a      | cc239            | P62942  | 64    | 39            |         |                  |                     |
| MTPN        | cc240            | P58546  | 144   | 14            |         |                  |                     |
| ACTG1       | cc241            | P63261  | 655   | 55            | Monomer | -                | -                   |
| RBBP4       | CC242            | Q09028  | 78    | 23            | Monomer | -                | -                   |
| SCRN1       | cc243            | Q12765  | 191   | 25            | Monomer | -                | -                   |
| P4HB        | CC244            | P07237  | 271   | 56            | Monomer | -                | -                   |
| ACTG1       | CC245            | P63261  | 98    | 41            |         |                  |                     |
| TUBB        | CC246            | P07437  | 110   | 46            |         |                  |                     |
| CALR        | CC246            | P27797  | 63    | 30            |         | CPH12            |                     |
| TUBA1B      | CC247            | P68363  | 75    | 32            |         |                  |                     |
| TUBB        | CC247            | P07437  | 113   | 39            |         |                  |                     |
| TPM3        | CC248            | Q5VU72  | 108   | 36            |         |                  |                     |
| CLU         | CC249            | P10909  | 63    | 81            |         |                  |                     |
| SERPINE1    | CC250            | P05121  | 66    | 94            |         |                  |                     |
| GSTP1       | CC250            | P09211  | 81    | 51            | -       | -                | CPC9                |
| PRDX2       | cc250            | P32119  | 255   | 31            | -       | -                | CPC9                |
| MDH1        | CC251            | P40925  | 77    | 50            | -       | -                | CPC10               |
| MDH2        | CC252            | P40926  | 148   | 61            | -       | CPH33            | CPC11, CPC12        |
| HNRPA1L3    | CC253            | P0C7M2  | 65    | 49            |         |                  |                     |
| CRABP1      | CC254            | P29762  | 96    | 77            |         |                  |                     |
| HNRNPA2B1   | CC255            | P22626  | 130   | 43            |         |                  |                     |
| PPIA        | CC256            | P62937  | 68    | 43            | -       | CPH13            | CPC1                |
| GSTP1       | CC257            | P09211  | 78    | 53            | -       | CPH14            | CPC1                |
| LDHB        | CC258            | P07195  | 175   | 47            | -       | CPH15            | CPC13               |
| LDHB        | CC259            | P07195  | 120   | 46            | -       | -                | CPC14               |
| LDHA        | CC260            | P00338  | 121   | 48            | -       | -                | CPC36, CPC38        |
| LDHB        | CC260            | P07195  | 133   | 53            | -       | -                | CPC15, CPC38        |
| VCP         | CC261            | P55072  | 116   | 36            | -       | CPH16            | CPC29               |
| ANXA6       | CC263            | P08133  | 135   | 49            | Monomer | -                | -                   |
| PDIA4       | CC263            | P13667  | 299   | 61            |         |                  |                     |
| DPP3        | CC264            | Q9NY33  | 168   | 44            | Monomer | -                | -                   |
| DDB1        | CC265            | Q16531  | 233   | 30            | Monomer | -                | -                   |
| FASN        | CC266            | P49327  | 230   | 30            | -       | -                | CPC6                |
| NPEPPS      | CC267            | P55786  | 88    | 30            | Monomer | -                | -                   |
| FTL         | CC268            | P02792  | 66    | 63            | -       | -                | CPC31, CPC32        |
| FTH1        | CC268            | P02794  | 113   | 65            | -       | CPH17            | CPC32               |
| HSP90AB1    | cc269            | P08238  | 158   | 37            | -       | CPH32            | -                   |
| UGP2        | CC270            | Q16851  | 214   | 44            |         |                  |                     |
| HSPA5       | CC270            | P11021  | 83    | 30            | -       | -                | CPC29, CPC30        |
| HSPA8       | cc271            | P11142  | 465   | 27            | -       | -                | CPC3, CPC4,<br>CPC5 |
| HSP90AB1    | CC272            | P08238  | 98    | 31            | -       | CPH18            | CPC5                |

### **Supplementary table 1(continued)**

| Gene<br>symbol | sample<br>number | ac. No. | score | Coverage % | Monomer | Homo<br>oligomer | Hetero oligomer               |
|----------------|------------------|---------|-------|------------|---------|------------------|-------------------------------|
| PGK1           | cc273            | P00558  | 101   | 44         | -       | -                | CPC7, CPC14,<br>CPC36, CPC38  |
| TUBB           | cc274            | P07437  | 81    | 41         |         |                  |                               |
| IDH1           | cc275            | O75874  | 75    | 32         | -       | CPH19            | CPC10, CPC11                  |
| PGD            | cc276            | P52209  | 85    | 50         | -       | CPH20            | CPC2, CPC6,<br>CPC12, CPC13   |
| TUBB           | cc276            | P07437  | 60    | 38         |         |                  |                               |
| TUBA1B         | cc277            | P68363  | 77    | 48         |         |                  |                               |
| TUBB           | cc277            | P07437  | 113   | 47         |         |                  |                               |
| PAICS          | cc278            | P22234  | 127   | 45         | -       | CPH21            | -                             |
| ENO1           | cc278            | P06733  | 76    | 45         | -       | -                | CPC28, CPC26,<br>CPC40        |
| PKM2           | cc279            | P14618  | 163   | 55         | -       | -                | CPC26, CPC27,<br>CPC28,CPC40  |
| ATIC           | cc280            | P31939  | 181   | 58         |         |                  |                               |
| ATIC           | cc281            | P31939  | 425   | 40         | -       | CPH22            | -                             |
| STIP1          | cc282            | P31948  | 78    | 46         | -       | CPH24            | CPC3                          |
| LTA4H          | cc282            | P09960  | 89    | 42         | -       | CPH23            | -                             |
| APEH           | cc283            | P13798  | 148   | 32         | -       | -                | CPC2                          |
| TARS           | cc284            | P26639  | 197   | 44         | -       | CPH25            | -                             |
| PRMT5          | cc285            | O14744  | 111   | 39         | -       | CPH26            | -                             |
| PRMT5          | cc286            | O14744  | 125   | 8          |         |                  |                               |
| VCL            | cc287            | P18206  | 75    | 30         | -       | CPH27            | -                             |
| VCL            | cc288            |         | 238   | 16         | -       | CPH28            | -                             |
| SET            | cc289            | O01105  | 422   | 33         | -       | CPH29            | -                             |
| HSPA4          | cc289            | P34932  | 109   | 38         | -       | -                | CPC17. CPC18                  |
| PRDX2          | cc289            | P32119  | 255   | 31         | Monomer | -                | -                             |
| HSP90AA1       | cc290            | P07900  | 81    | 40         | -       | CPH30            | CPC16, CPC17,<br>CPC22, CPC23 |
| IARS           | cc291            | P41252  | 143   | 32         | -       | -                | CPC33                         |
| ACLY           | cc292            | P53396  | 318   | 51         | -       | -                | CPC27, CPC28                  |
| AASS           | cc293            | O9UDR5  | 168   | 42         |         |                  | ,                             |
| KRT1           | cc294            | P04264  | 64    | 27         |         |                  |                               |
| OARS           | cc294            | P47897  | 141   | 43         | -       | -                | CPC33                         |
| PSMD3          | cc295            | 043242  | 69    | 43         | -       | _                | CPC35                         |
| DARS           | cc296            | P14868  | 88    | 42         | -       | -                | CPC33                         |
| CCT2           | cc296            | P78371  | 95    | 47         | _       | _                | CPC34                         |
| CCT8           | cc296            | P50990  | 108   | 42         | _       | _                | CPC34                         |
| TUBB           | cc297            | P07437  | 121   | 44         |         |                  | 01 00 1                       |
| PSMC5          | cc298            | P62195  | 105   | 55         | _       | -                | CPC35                         |
| ENO1           | cc298            | P06733  | 109   | 64         | _       | _                | CPC30 CPC31                   |
| INO1           | cc300            | 09NPH2  | 73    | 27         |         |                  | 0.000, 01001                  |
| DPYSI 3        | cc301            | 01/1105 | 125   | 50         | _       | CPH31            | _                             |
|                | 00301            | V1+175  | 145   | 50         |         | 011151           |                               |

## Supplementary table 1 (continued)

| Gene<br>symbol | sample<br>number | ac. No. | score | Coverage % | Monomer | Homo<br>oligomer | Hetero oligomer               |
|----------------|------------------|---------|-------|------------|---------|------------------|-------------------------------|
| MDH2           | 1                | P40926  | 84    | 37         | -       | MPH1             | MPC17                         |
| PRDX1          | 2                | Q06830  | 135   | 51         | -       | MPH2             | MPC3                          |
| SHMT2          | 3                | P34897  | 113   | 15         | -       | MPH3             | MPC24                         |
| VDAC1          | 5                | P21796  | 143   | 42         |         |                  |                               |
| CYC1           | 7                | P08574  | 130   | 16         | -       | -                | MPC12, MPC16                  |
| GAPDH          | 9                | P04406  | 61    | 26         | -       | -                | MPC15, MPC22,<br>MPC25, MPC26 |
| HSPE1          | 11               | P61604  | 286   | 65         | -       | -                | MPC17, MPC18,<br>MPC19        |
| CALR           | 13.1             | P27797  | 489   | 32         | -       | -                | MPC5                          |
| ALB            | 14               | P02769  | 259   | 14         |         |                  |                               |
| GLUD1          | 16               | P00367  | 176   | 51         | -       | MPH4             | MPC30                         |
| HSPD1          | 17               | P10809  | 706   | 42         | -       | -                | MPC32, MPC33,<br>MPC34, MPC36 |
| CS             | 19               | O75390  | 165   | 15         | -       | MPH5             | MPC17                         |
| ATP5A1         | 20               | P25705  | 296   | 36         | -       | -                | MPC39, MPC41                  |
| ATP5B          | 21               | P06576  | 237   | 54         | -       | -                | MPC31, MPC40,<br>MPC31        |
| ATP5B          | 22               | P06576  | 318   | 45         | -       | -                | MPC31, MPC32,<br>MPC34        |
| ATP5A1         | 23               | P25705  | 224   | 37         | -       | -                | MPC32                         |
| LDHA           | 24               | P00338  | 84    | 26         | -       | -                | MPC20                         |
| UQCRC2         | 34               | P22695  | 292   | 52         |         |                  |                               |
| ТКТ            | 37               | P29401  | 207   | 51         | -       | -                | MPC28, MPC29,<br>MPC41        |
| H2AFX          | 39               | P16104  | 119   | 26         |         |                  |                               |
| ATP5O          | 42               | P48047  | 80    | 63         | -       | -                | MPC40                         |
| ATP5F1         | 43               | P24539  | 89    | 44         | -       | -                | MPC35, MPC40                  |
| GPI            | 46               | P06744  | 90    | 35         | -       | -                | MPC28                         |
| PHB2           | 50               | Q99623  | 308   | 59         |         |                  |                               |
| CALM1          | 57               | P62158  | 57    | 43         |         |                  |                               |
| ANXA5          | 60               | P08758  | 81    | 42         | Monomer | -                | -                             |
| ANXA2          | 63               | P07355  | 372   | 40         | -       | -                | MPC1, MPC2, MPC4              |
| YWHAE          | 64               | P62258  | 95    | 62         | -       | MPH6             | -                             |
| ACTB           | 65               | P60709  | 317   | 32         | -       | -                | MPC1                          |
| CALM1          | 66               | P62158  | 93    | 24         | Monomer | -                | -                             |

**Supplementary table 2:** Identified proteins in membrane associated fraction and their oligomerization state according to the workflow represented in fig. 3. Proteins that we cannot resolve any oligomerization state for them are highlighted in gray.

| Gene<br>symbol | sample<br>number | ac. No. | score | Coverage % | Monomer | Homo<br>oligomer | Hetero oligomer                                |
|----------------|------------------|---------|-------|------------|---------|------------------|--|
| ATP5B          | 70               | P06576  | 620   | 52         | -       | -                | MPC9, MPC10,<br>MPC11                          |
| P4HB           | 72               | P07237  | 123   | 42         | -       | MPH7             | MPC3, MPC5                                     |
| VDAC1          | 73               | P21796  | 325   | 50         | -       | -                | MPC2   |
| ALDOA          | 77               | P04075  | 122   | 50         | -       | MPH8             | MPC26  |
| LDHB           | 78               | P07195  | 72    | 37         | -       | MPH9             | MPC21  |
| LDHA           | 79               | P00338  | 113   | 16         |         |                  |  |
| LDHA           | 80               | P00338  | 87    | 16         |         |                  |  |
| ATP5A1         | 83               | P25705  | 558   | 51         | -       | -                | MPC12, MPC35,<br>MPC36                         |
| ATP5B          | 84               | P06576  | 679   | 61         | -       | -                | MPC12, MPC35,<br>MPC36, MPC40                  |
| ATP5A1         | 88               | P25705  | 149   | 29         | -       | -                | MPC13, MPC24,<br>MPC25                         |
| CANX           | 93               | P27824  | 230   | 13         | -       | -                | MPC23, MPC27                                   |
| EEF2           | 94               | P13639  | 189   | 48         |         |                  |  |
| EEF2           | 95               | P13639  | 62    | 8          | -       | -                | MPC11  |
| H2AFV          | 96               | Q71UI9  | 78    | 24         |         |                  |  |
| ACTN4          | 98               | O43707  | 117   | 34         | -       | MPH10            | -  |
| HSP90B1        | 98               | P14625  | 66    | 32         | -       | MPH11            | -  |
| HSP90B1        | 108              | P14625  | 88    | 32         | -       | -                | MPC31, MPC34,<br>MPC37                         |
| VCP            | 108.2            | P55072  | 93    | 34         | -       | -                | MPC37, MPC38                                   |
| PSMD2          | 108.2            | Q13200  | 88    | 32         | -       | -                | MPC38  |
| IMMT           | 110              | Q16891  | 135   | 41         | -       | -                | MPC16  |
| HSP90AB1       | 110              | P08238  | 86    | 28         |         |                  |  |
| SET            | 112              | Q01105  | 89    | 22         | -       | MPH12            | -  |
| HSP90AA1       | 115              | P07900  | 132   | 12         | -       | -                | MPC30, MPC33                                   |
| RPN1           | 120              | P04843  | 165   | 25         |         |                  |  |
| PDIA3          | 127              | P30101  | 118   | 51         | -       | MPH13            | MPC6, MPC7                                     |
| TUBB           | 128              | P07437  | 76    | 30         |         |                  |  |
| HSPA5          | 200              | P11021  | 572   | 31         | -       | -                | MPC8, MPC9                                     |
| AASS           | 202              | Q9UDR5  | 118   | 7          |         |                  |  |
| HSPD1          | 203              | P10809  | 360   | 27         | -       | -                | MPC8, MPC9,<br>MPC10, MPC19                    |
| HSP90B1        | 203.2            | P14625  | 220   | 18         | -       | MPH14            | MPC14, MPC23,<br>MPC27, MPC31                  |
| NDUFS2         | 209              | O75306  | 135   | 19         |         |                  |  |
| HSPD1          | 212m             | P10809  | 446   | 17         | -       | -                | MPC13, MPC14,<br>MPC15, MPC24,<br>MPC25        |
| UOCRC2         | n1               | P22695  | 102   | 51         | -       | -                | MPC4   |
| HSPA8          | n2               | P11142  | 128   | 42         | -       | -                | MPC7, MPC18                                    |
| HSPA5          | n2               | P11021  | 124   | 39         | -       | -                | MPC6   |
| XRCC6          | n3               | P12956  | 95    | 37         |         |                  |  |
| PGK1           | n4               | P00558  | 77    | 41         | -       | -                | MPC10, MPC15,<br>MPC20, MPC21,<br>MPC22, MPC26 |

### **Supplementary table 2 (continued)**

| PKM2 | nб | P14618 | 230 | 59 | - | MPH15 | MPC28 |
|------|----|--------|-----|----|---|-------|-------|
|------|----|--------|-----|----|---|-------|-------|

**Supplementary table 3:** Comparison of the protein complexes resolved in cytoplasmic and membrane-associated fraction.

| Protein name  | Membrane<br>Associated<br>fraction (MAF)  | Cytoplsamic<br>Fraction (CF) | Comparison   |
|---|---|------------------------------|--|
| Alpha-aminoadipic<br>semialdehyde<br>synthase,<br>mitochondrial | 202   | cc293                        | In both fractions it exists in about 840 kDa complex, but any other partner has not been detected.   |
| Actin   | 65 (ACTB )  | CC245 and cc241 (ACTG1)      | In MAF in complex with ANXA2(<br>MPC1), in cytoplasmic fraction cc241<br>is monomer but nothing can be reported<br>for spot CC245 in MAF.  |
| Fructose-<br>bisphosphate<br>aldolase A                         | 77  | CC077                        | In both fractions it found to be tetramer,<br>but in different complexes : in CF in<br>complex with GAPDH, PGK1 and TPI<br>(CPC7), PGK1 and LDHA (CPC36),<br>LDHA and TPI (CPC37), in MAF in<br>complex with GAPDH and PGK1<br>(MPC26).  |
| Annexin   | 63 (ANXA2)<br>and<br>60(ANXA5)  | CC263<br>(ANXA6)             | Monomeric form of ANXA5 and<br>ANXA6 was found in MAF and CF<br>respectively. In MAF, ANXA2 was<br>found in complex with ACTB (MPC1),<br>VDAC1 (MPC2), UQCRC2 (MPC4).  |
| ATP synthase<br>subunits  | 20, 23, 83, 88<br>(ATP5A1) and<br>21, 22, 70, 84<br>(ATP5B) and<br>43 (ATP5F1)<br>and 42<br>(ATP5O) | CC205<br>(ATP5B)             | In CF ATP5B was found in complex<br>with TPI1, PRDX1 (CPC20), TUBA1C<br>(CPC21), HSPD1 (CPC24) but in MAF,<br>ATP5A1 was found in complex with<br>ATP5B (MPC39), TKT (MPC41),<br>HSPD1, ATP5B (MPC32), ATP5B,<br>ATP5F1 (MPC35), ATP5B, HSPD1<br>(MPC36), CYC1, ATP5B (MPC12),<br>HSPD1 (MPC13), SHMT2, HSPD1<br>(MPC24), GAPDH, HSPD1 (MPC25)<br>also ATP5B was found in complex with<br>HSPD1, HSPA5 (MPC9), HSPD1,<br>PGK1 (MPC10), EEF2 (MPC11). |
| calmodulin  | 57 , 66   | cc229                        | Dimeric (cc229) and monomeric (66)<br>form of it was found in CF and MAF<br>respectively. Nothing can be reported<br>for spot 57 in MAF.   |
| Calreticulin  | 13.1  | CC246                        | Dimeric form (CPH12) of it was found<br>in CF but in MAF it was found in a<br>complex with P4HB (MPC5).  |
| Glyceraldehyde-3-<br>phosphate<br>dehydrogenase                 | 9   | cc009                        | In CF found in complex with ALDOA,<br>PGK1 and TPI1 (CPC7), HSPA4<br>(CPC18), PGK1 and LDHB/ LDHA<br>(CPC38), but in MAF in complex with<br>PGK1 and HSPD1 (MPC15), PGK1<br>(MPC22), HSPD1 and ATP5B<br>(MPC25), PGK1 and ALDOA<br>(MPC26).  |

# Supplementary table 3 (continued)

| Protein name                                   | Membrane<br>Associated<br>fraction<br>(MAF) | Cytoplsamic<br>Fraction (CF) | Comparison  |
|--|---|------------------------------|---|
| Glucose-6-<br>phosphate<br>isomerase           | 46  | CC204                        | In CF found in complex with TPI1<br>(CPC19) or TKT (CPC25) but in MAF in<br>complex with TKT and PKM2 (MPC28).  |
| Histone H2A type<br>1                          | 96 (H2AFV)<br>and 39<br>(H2AFX)             | cc235<br>(HIST1H2AG)         | various forms in different fractions  |
| Heat shock<br>protein HSP 90-<br>beta          | 110   | cc269 and<br>CC272           | In CF its dimeric form has been found<br>with different MW of protein (CPH18,<br>CPH32) and also it found in complex with<br>HSPA8 (CPC5) but in MAF Nothing can<br>be reported for spot 110 in MAF.  |
| 78 kDa glucose-<br>regulated protein           | 200, n2                                     | CC270                        | In CF found in complex with VCP<br>(CPC29) and ENO1 (CPC30) but in MAF<br>in complex with PDIA3 (MPC6), HSPD1<br>(MPC8) and HSPD1, ATP5B (MPC9).  |
| Heat shock<br>cognate 71 kDa<br>protein        | n2  | cc271                        | In both fractions it found in complex with<br>HSPE1 (CPC4, MPC18). In CF it also<br>found in complex with STIP1 (CPC3) ,<br>HSP90AB1 (CPC5) but in MAF in<br>complex with PDIA3 (MPC7).   |
| 60 kDa heat shock<br>protein,<br>mitochondrial | 17, 203,<br>212m                            | CC017                        | In CF found in complex with ATP5B<br>(CPC24), ENO1 and PKM2 (CPC26),<br>IMPDH2 (CPC39) but in MAF in complex<br>with HSPA5 (MPC8), HSPA5 and ATP5B<br>(MPC9), PGK1 and ATP5B (MPC10),<br>ATP5A1 (MPC13), HSP90B1 (MPC14),<br>GAPDH and PGK1 (MPC15), HSPE1<br>(MPC19), SHMT2 and ATP5A1<br>(MPC24), GAPDH and ATP5B (MPC25),<br>ATP5B and ATP5A1 (MPC32),<br>HSP90AA1 (MPC33), ATP5B and<br>HSP90B1 (MPC34), ATP5B and ATP5A1<br>(MPC36). |
| 10 kDa heat shock<br>protein,<br>mitochondrial | 11  | CC011                        | In both fractions it found in complex with<br>HSPA8 (CPC4, MPC18). In MAF it also<br>found in complex with MDH2, CS<br>(MPC17), HSPD1 (MPC19).  |
| L-lactate<br>dehydrogenase A<br>chain          | 80,24,79                                    | CC217, CC260                 | In both fractions it found in complex with<br>PGK1 however in CF found in complex<br>with PGK1 and ALDOA (CPC36), PGK1<br>and GAPDH (CPC38) but in MAF in<br>complex with PGK1 (MPC20) but<br>nothing can be reported for spot 79 and<br>80.  |

### **Supplementary table 3 (continued)**

| Protein name                          | Membrane<br>Associated<br>fraction<br>(MAF) | Cytoplsamic<br>Fraction (CF)                             | Comparison  |
|---------------------------------------|---|--|---|
| L-lactate<br>dehydrogenase B<br>chain | 78  | CC258, CC259,<br>CC260                                   | Tetrameric form of LDHB (MPH9,<br>CPH15) and its complex with PGK1<br>(MPC20, CPC14) has been found in both<br>fractions. In CF it found in complex with<br>PGD (CPC13), ECHS1 (CPC15), PGK1,<br>GAPDH (CPC38).   |
| Malate<br>dehydrogenase               | 1 (MDH2)                                    | CC251(MDH1),<br>CC252 (MDH2)                             | Tetrameric form of mitochondrial (MDH2)<br>of it (MPH1) has been found in MAF.<br>Mitochondrial form of MDH has been<br>found in both fractions but in different<br>complexes, in CF in complex with IDH1<br>(CPC11) or PGD (CPC12), in MAF in<br>complex with HSPE1, CS (MPC17).<br>Cytoplasmic form of MDH has been found<br>in CF in complex with IDH1, SOD1<br>(CPC10). |
| Protein disulfide-<br>isomerase       | 127 (PDIA3)                                 | CC244 (P4HB),<br>CC263 (PDIA4)                           | Dimeric form of PDIA3 was found in MAF<br>and also in complex with HSPA5 (MPC6),<br>HSPA8 (MPC7). Monomeric form of<br>P4HB was found in CF but nothing can be<br>reported for spot CC263 in CF.  |
| Phosphoglycerate<br>kinase 1          | n4  | cc273  | In both fractions it found in complex with<br>LDHB (MPC21, cPC14). In CF found in<br>complex with GAPDH, ALDOA, TPI1<br>(CPC7), ALDOA, LDHA (CPC36),<br>GAPDH, LDHB/ LDHA (CPC38). In<br>MAF in complex with HSPD1, ATP5B<br>(MPC10), HSPD1, GAPDH (MPC15),<br>LDHA (MPC20), GAPDH (MPC22),<br>GAPDH, ALDOA (MPC26).  |
| Pyruvate kinase<br>isozymes M1/M2     | n6  | cc279  | Tetrameric form of PKM2 was found in<br>MAF (MPH15). In CF found in complex<br>with HSPD1, ENO1 (CPC26), ACLY<br>(CPC27), ACLY, ENO1 (CPC28), TKT,<br>ENO1 (CPC40). In MAF found in complex<br>with TKT, GPI (MPC28).   |
| Peroxiredoxin                         | 2 (PDX1)                                    | cc234 (PDX1),<br>cc250 , cc289<br>(PDX2),<br>CC225(PDX6) | Tetrameric form of PRDX1 (MPH2) was<br>found in MAF while monomeric form of<br>PDX2 and dimeric form of PDX6 (CPH4)<br>was found in CF.PRDX1, was found in<br>complex with P4HB (MPC3) in MAF, but<br>in CF in complex with TP11, ATP5B<br>(CPC20). PRDX2 was found in complex<br>with GSTP1 (CPC9) in CF.  |

## **Supplementary table 3 (continued)**

| Protein name                                    | Membrane<br>Associated<br>fraction<br>(MAF) | Cytoplsamic<br>Fraction (CF)   | Comparison  |
|---|---|--|---|
| Proteasome                                      | 108.2<br>(PSMD2)                            | cc208(PSMA1),<br>CC209<br>(PSMA7),<br>CC212<br>(PSMB1),<br>CC213<br>(PSMB2),<br>cc298<br>(PSMC5),<br>cc295 (PSMD3) | various subunits in different fractions.  |
| Protein SET                                     | 112   | cc289  | Dimeric form of it found in both fractions (MPH12, CPH29).  |
| Transketolase                                   | 37  | CC207  | Hexameric form of it has been found in CF<br>(CPH3). In CF found in complex with GPI<br>(CPC25), ENO1, PKM2 (CPC40) but in<br>MAF in complex with GPI, PKM2<br>(MPC28), GLUD1 (MPC29), ATP5A1<br>(MPC41). |
| Tubulin   | 128 (TUBB)                                  | CC247, cc277<br>(TUBA1B),<br>CC205<br>(TUBA1C),<br>CC205, CC246,<br>CC247, cc274,<br>cc276, cc277,<br>cc297 (TUBB) | Among all of these just complexes with<br>ATP5B (CPC21), HSP90AA1 (CPC22) for<br>TUBA1C and with HSP90AA1 (CPC23) for<br>TUBB has been found.   |
| Transitional<br>endoplasmic<br>reticulum ATPase | 108.2                                       | CC261  | Hexameric form of it has been found in CF<br>(CPH16). In CF found in complex with<br>HSPA5 (CPC29) but in MAF in complex<br>with HSP90B1 (MPC37), PSMD2 (MPC38).  |
| 14-3-3 protein<br>epsilon                       | 64  | CC218  | Dimeric form of it has been found in MAF (MPH6). In CF it found in complex with YWHAZ (CPC8).   |

| Gene<br>Symbol     | sample<br>number | Uniprot<br>ac. | FD-MW        | SD-MW  | T-MW    |  |  |  |  |  |
|--------------------|------------------|----------------|--------------|--------|---------|--|--|--|--|--|
| Cytosolic monomers |                  |                |              |        |         |  |  |  |  |  |
| СКВ                | CC220            | P12277         | 64.0         | 44.0   | 42.9    |  |  |  |  |  |
| RBBP4              | CC242            | Q09028         | 68.5         | 57.0   | 46.4    |  |  |  |  |  |
| P4HB               | CC244            | P07237         | 90.0         | 69.0   | 57.5    |  |  |  |  |  |
| ANXA6              | CC263            | P08133         | 119.9        | 74.0   | 76.2    |  |  |  |  |  |
| DPP3               | CC264            | Q9NY33         | 128.3        | 86.0   | 82.9    |  |  |  |  |  |
| DDB1               | CC265            | Q16531         | 116.2        | 88.0   | 128.1   |  |  |  |  |  |
| PRDX2              | cc289            | P32119         | 102.0        | 16.2   | 115.3   |  |  |  |  |  |
| ACTG1              | cc241            | P63261         | 45           | 42.1   | 70.0    |  |  |  |  |  |
| SCRN1              | cc243            | Q12765         | 55           | 47.0   | 61.3    |  |  |  |  |  |
| NPEPPS             | CC267            | P55786         | 101          | 99.1   | 134.8   |  |  |  |  |  |
| ANP32A             | CC223            | P39687         | 33           | 24.2   | 62.5    |  |  |  |  |  |
|                    | Me               | mbrane assoc   | ciated monor | ners   |         |  |  |  |  |  |
| ANXA5              | 60               | P08758         | 41           | 35.153 | 54.7733 |  |  |  |  |  |
| CALM1              | 66               | P62158         | 20           | 16.696 | 31.3644 |  |  |  |  |  |

**Supplementary Table 4.** Monomers found in BN/SDS PAGE map of cytoplasmic and membrane associated fraction of hESCs

FD-MW: MW of the protein according to its position in the first dimension (BN electrophoresis); SD-MW: MW of the protein in the second dimension (SDS-PAGE); T-MW: theoretical MW of the protein;

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supplementary fig 1: The efficiency of fractionation was confirmed by western blotting. M: Membrane fraction; C: Cytosolic fraction.

supplementary fig 2: The reproducibility of the technique has been confirmed by comparative analysis of protein spots from three independent biological samples

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sodium potassium ATPase (Plasma membrane marker)

pan cadherin

actin

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