

Supplementary Table 1: Summary data of all DEP in varicocele group compared to the fertile group highlighting protein abundance, expression (overexpressed, underexpressed, and unique) and enriched pathways with respect to related proteins as revealed by GO, STRAP, DAVID, and reactome analysis

UniProt number	Protein name	Level	Carbohydrate metabolism	Cell death and survival	Cell-to-cell signaling and interaction	Cellular assembly and organization	Cellular function and maintenance	Small molecule biochemistry	Cellular growth and proliferation	Posttranslational modifications	Cellular development
P02751	Fibronectin isoform 3 preproprotein	↑	x	x	x	x	x				
P54652	Heat shock-related 70 protein 2	↓							x		x
Q5BJF6	Outer dense fiber protein 2 isoform 3	↑				x	x				
P49221	Protein-glutamine gamma-glutamyltransferase 4	↑									
O75369	Filamin-B isoform 2	↑				x					
Q9BXF9	Tektin-3	↑				x					
Q96KP4	Cytosolic nonspecific dipeptidase isoform 1	↑									
P05164	Myeloperoxidase precursor	↑									
Q96QE4	Leucine-rich repeat-containing protein 37B precursor	↓									
P24752	Acetyl-CoA acetyltransferase, mitochondrial precursor	↓									
Q9Y265	RUVBL1	↓						x	x		x
P40939	Trifunctional enzyme subunit alpha, mitochondrial precursor	↓									
Q99798	Aconitate hydratase, mitochondrial precursor	↓	x					x			
Q8NEB7	Acrosin-binding protein precursor	↓							x		x
P22695	Cytochrome b-c1 complex subunit 2, mitochondrial precursor	↓									
P46940	Ras GTPase-activating-like protein IQGAP1	↑		x	x	x					
P11177	Pyruvate dehydrogenase E1 component subunit beta, mitochondrial isoform 1 precursor	↓									
A6NMS7	Leucine-rich repeat-containing protein 37A precursor	↓									
P20160	Azurocidin preproprotein	↑									
P26640	Vallyl-tRNA synthetase	↓									
Q9H0K4	Radial spoke head protein 6 homolog A	↓									
P53396	ATP-citrate synthase isoform 1	↑	x	x							
Q06210	Glucosamine-fructose-6-phosphate aminotransferase (isomerizing) isoform 1	↑									
Q16891	Mitochondrial inner membrane protein isoform 3	↓						x			
Q96FJ2	Dynein light chain 2, cytoplasmic	↓									
Q92597	Protein NDRG1	↑		x	x	x					
Q15506	Sperm surface protein Sp17	↓							x		x
P29692	Elongation factor 1-delta isoform 1	↓							x		x
Q95757	Heat shock 70 protein 4L	↓							x		x
P31937	3-hydroxyisobutyrate dehydrogenase, mitochondrial precursor	↓									
P28331	NADH-ubiquinone oxidoreductase 75 subunit, mitochondrial isoform 1	↓									
P11215	Integrin alpha-M isoform 1 precursor	UV									
P13667	Protein disulfide-isomerase A4 precursor	↓									
O75390	Citrate synthase, mitochondrial precursor	↓						x			
P10644	cAMP-dependent protein kinase type I-alpha regulatory subunit	↓						x	x		x
Q9H1X1	Radial spoke head protein 9 homolog isoform 1	↓									
Q13733	Sodium/potassium-transporting ATPase subunit alpha-4 isoform 1	↓						x	x		x
P56597	Nucleoside diphosphate kinase homolog 5	↓							x		x

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P05107	Integrin beta-2 precursor	UV									
P10606	Cytochrome c oxidase subunit 5B, mitochondrial precursor	↓									
P29144	Tripeptidyl-peptidase 2	↓									
P50213	NAD subunit alpha, mitochondrial precursor	↓	x					x			
Q8N1F7	Nuclear pore complex protein Nup93 isoform 1	↓									
Q9UNM6	26S proteasome non-ATPase regulatory subunit 13 isoform 1	↓							x		x
Q92526	T-complex protein 1 subunit zeta-2 isoform 1	↓							x		x
P61769	Beta-2-microglobulin precursor	↓									
Q96AB3	Isochorismatase domain-containing protein 2, mitochondrial isoform 2	↓									
P16219	Short-chain specific acyl-CoA dehydrogenase, mitochondrial precursor	↓						x			
P29803	Pyruvate dehydrogenase E1 component subunit alpha, testis-specific form, mitochondrial precursor	↓									
Q7Z3B4	Nucleoporin p54	↓								x	
Q96E40	Uncharacterized protein C9orf9	↓									
P30519	Heme oxygenase 2	↓						x			
P30084	Enoyl-CoA hydratase, mitochondrial	↓									
O14967	Calmequin precursor	↓									
P10253	Lysosomal alpha-glucosidase preproprotein	↓	x						x		x
Q9NUJ1	Abyhdrolase domain-containing protein 10, mitochondrial precursor	↓									
O00303	Eukaryotic translation initiation factor 3 subunit F	↓									
Q13011	Delta(3.5)-Delta(2.4)-dienoyl-CoA isomerase, mitochondrial precursor	↓									
Q15046	Lysyl-tRNA synthetase isoform 1	↓							x		
Q5JVL4	EF-hand domain-containing protein 1 isoform 1	↓									
O43837	NAD subunit beta, mitochondrial isoform a precursor	↓									
Q9NY47	Voltage-dependent calcium channel subunit alpha-2/delta-2 isoform c	↓							x		x
Q13200	26S proteasome non-ATPase regulatory subunit 2	↓									
Q5JRA6	Melanoma inhibitory activity protein 3 precursor	↓									
O95202	LETM1 and EF-hand domain-containing protein 1, mitochondrial precursor	↓									
Q96M32	AK7	↓							x		x
O00487	26S proteasome non-ATPase regulatory subunit 14	↓									
Q02218	2-oxoglutarate dehydrogenase, mitochondrial isoform 3 precursor	↓						x			
P52907	F-actin-capping protein subunit alpha-1	↓									
P09668	Pro-cathepsin H preproprotein	↓									
Q5T655	Coiled-coil domain-containing protein 147	↓									
Q9NS69	Mitochondrial import receptor subunit TOM22 homolog	↓									
P36543	V-type proton ATPase subunit E 1 isoform a	↓									x
Q53EV4	Leucine-rich repeat-containing protein 23 isoform a	↓									
Q96NG3	Tetrapeptide repeat protein 25	↓									

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P02647	Apolipoprotein A-I preproprotein	↓	x					x	x		
Q96HS1	Serine/threonine-protein phosphatase PGAM5, mitochondrial isoform 1	↓									
Q75WM6	Testis-specific H1 histone	↓									
Q75976	Carboxypeptidase D isoform 1 precursor	↓									
Q9UKU0	Long-chain-fatty-acid-CoA ligase 6 isoform e	↓						x	x		x
Q9UI14	Prenylated Rab acceptor protein 1	↓									
Q5T124	UBX domain-containing protein 11 isoform 1	↓									x
Q13347	Eukaryotic translation initiation factor 3 subunit I	↓							x		x
P37198	Nuclear pore glycoprotein p62	↓									
Q9BSF0	UPF0733 protein C2orf88	↓									
Q13618	Cullin-3	↓							x		x
P62826	GTP-binding nuclear protein Ran	↓						x	x		x
P56192	Methionyl-tRNA synthetase, cytoplasmic	↓									
P17612	cAMP-dependent protein kinase catalytic subunit alpha isoform 2	↓									
E9KL36	Transthyretin precursor	↓									
Q6PGQ1	Uncharacterized protein C22orf43	UF									
Q9BVL2	Nucleoporin p58/p45 isoform a	UF									
Q5VTT2	Uncharacterized protein C9orf135	UF							x		x
Q96M95	Coiled-coil domain-containing protein 42A isoform 1	UF									
Q7Z4H3	HDDC2	UF									
Q9BVM2	Protein DPCD	UF									
P21281	V-type proton ATPase subunit B, brain isoform	UF									
P52272	Heterogeneous nuclear ribonucleoprotein M isoform a	UF									
Q86Y82	Syntaxin-12	UF									

UF: unique to fertile group; UV: unique to varicocele group; DEP: differentially expressed proteins; GO: gene ontology; STRAP: Software for Researching Annotations of Proteins; DAVID: Database for Annotation, Visualization and Integrated Discovery; RUVBL1: RuvB-like 1; NDRG1: N-myc downstream-regulated protein 1; NAD: isocitrate dehydrogenase; HDDC2: HD domain-containing protein 2; DPCD: protein DPCD; AK7: adenylylate kinase 7