Appendix

Table 1. List of six diseases involving ribosomal dysfunction

Disease	Defective genes	Clinical features
Diamond Blackfan anemia	RPS7, RPS10, RPS15, RPS17, RPS19, RPS24, RPS26, RPS27A, RPL5, RPL11, RPL26, RPL35A, RPL36	Macrocytic anemia, short stature, craniofacial defects, thumb abnormalities
5q-syndrome	RPS14	Macrocytic anemia, hypolobulated micromegakaryocytes
Schwachman-Diamond syndrome	SBDS, low expression of RPS9, RPS20, RPL6, RPL15, RPL22, RPL23, RPL29	Neutropenia/infections, pancreatic insufficiency, short stature
X-linked dyskeratosis congenita	DKC1	Cytopenias, skin hyperpigmentation, nail dystrophy, oral leukoplakia
Cartilage hair hypoplasia	RMRP	Hypoplastic anemia, short-limbed dwarfism, hypoplastic hair
Treacher Collins syndrome	TCOF1	Craniofacial abnormalities
Liver cancer	S8, L12, L23a, L27, L30, L36, L36a	
Gastric cancer	L15, S13, L6, L13	Upregulation is associated with increased cell proliferation, drug resistance, and poor survival
Colorectal cancer	L13, S11, L7, L10a, L44, S19, L19, S27L, Sa, S8, S12, S18, S24, L13a, L18, L28, L32, L35a	Downregulation is associated with the ribosomes of the mucosal epithelia
Prostate cancer	S2, L19	Elevated L19 expression is associated with advanced disease
Esophageal cancer	L14, L15, pS6	Elevated levels of pS6 are associated with shorter survival and an adverse prognosis
Lung cancer	L22, pS6	Higher pS6 expression is associated with a shorter metastasis-free survival
Breast cancer	L41	L41 downregulation is related to malignant transformation
Osteosarcoma	L7a	Downregulation of L7a is associated with poor survival of osteosarcoma patients with lung metastasis
Leukemia lymphoma	S6, L23	Elevated levels of L23 are associated with poor survival
Ovarian cancer	S4X	High expression of RPS4X is associated with a lower risk of death and later disease progression

Table 2. Level of conservation of the 80 eukaryotic proteins, sorted according to the degree of conservation

Protein name	No. sequences	No. species	Percent conservation	Protein name	No. sequences	No. species	Percent conservation
L40	53	44	86.6	S8	56	44	48.6
L41	39	33	86.4	L23A	54	41	48.2
LP3	2	1	84.0	S27A	52	43	48.0
S14	56	41	78.3	L37	58	44	47.7
S23	51	41	70.4	L17	51	41	45.8
S5	50	40	69.7	S6	59	45	44.7
L23	54	41	67.9	L32	57	43	43.4
S13	49	41	66.9	L9	50	41	43.4
S3	52	41	66.7	L4	49	40	43.3
L36A	59	44	63.6	SA	51	41	43.0
S15A	58	41	63.1	L18	59	44	42.9
S9	50	40	62.9	L35	51	39	42.9
S18	51	39	62.5	L31	55	44	41.1
S15	51	41	62.3	L5	51	41	40.8
S28	57	45	61.5	L7	55	41	40.7
S27	54	43	61.3	S7	53	40	40.2
L11	57	40	59.5	S3A	56	45	39.7
S16	53	41	59.3	L13A	53	39	39.0
L37A	57	44	58.2	S24	56	45	38.2
L12	53	41	57.6	S12	50	40	37.8
S20	53	40	57.4	S21	47	41	37.0
L10	53	39	57.0	L36	52	40	36.4
L39	54	44	56.9	L34	57	42	35.2
L15	55	45	56.7	L22	47	39	34.8
L8	51	40	56.5	L27	53	41	34.1
L27A	53	41	56.5	L35A	55	42	34.0
S29	51	41	55.4	L21	51	43	34.0
S30	51	41	55.0	L7A	53	45	33.5
L3	49	40	54.7	LP0	46	39	32.6
S2	50	41	53.9	L18A	56	43	32.1
S11	53	41	53.8	S25	51	42	31.9
S26	56	41	52.8	S10	54	41	31.5
L26	53	41	52.4	S19	54	43	30.9
L30	52	44	52.3	L13	51	42	30.9
L38	49	39	52.3	L6	51	40	30.9
S4X	58	44	51.2	LP1	54	41	30.0
S17	55	44	50.8	LP2	59	40	28.4
L10A	52	41	50.7	L24	59	45	21.4
L19	58	43	50.3	L14	49	42	18.7
L29	45	39	49.2	L28	41	33	17.5

Table 5. Presence/absence of ribosomal proteins between *Escherichia coli*, the human mitochondrial ribosome, and the chloroplast of *Chlamydomonas reinhardtii*

RP name	*E. coli*	*H. sapiens* mitochondrion	*Ch. reinhardtii* chloroplast	RP name	*E. coli*	*H. sapiens* mitochondrion	*Ch. reinhardtii* chloroplast
S1P	rpsA		PRPS1	L7/L12P	rplL	MRPL12	PRPL12
S2P	rpsB	MRPS2	PRPS2	L13P	rplM	MRPL13	PRPL13
S3P	rpsC		PRPS3	L14P	rplN	MRPL14	PRPL14
S4P	rpsD		PRPS4	L15P	rplO	MRPL15	PRPL15
S5P	rpsE	MRPS5	PRPS5	L16P	rplP	MRPL16	PRPL16
S6P	rpsF	MRPS6	PRPS6	L17P	rplQ	MRPL17	PRPL17
S7P	rpsG	MRPS7	PRPS7	L18P	rplR	MRPL18	PRPL18
S8P	rpsH		PRPS8	L19P	rplS	MRPL19	PRPL19
S9P	rpsI	MRPS9	PRPS9	L20P	rplT	MRPL20	PRPL20
S10P	rpsJ	MRPS10	PRPS10	L21P	rplU	MRPL21-1,2,3,4	PRPL21
S11P	rpsK	MRPS11-1,2		L22P	rplV	MRPL22	PRPL22
S12P	rpsL	MRPS12-1,2,3	PRPS12	L23P	rplW	MRPL23	PRPL23
S13P	rpsM		PRPS13	L24P	rplX	MRPL24-1,2	PRPL24
S14P	rpsN	MRPS14	PRPS14	L25P	rplY		
S15P	rpsO	MRPS15	PRPS15	L27P	rpmA	MRPL27-1,2,3	PRPL27
S16P	rpsP	MRPS16	PRPS16	L28P	rpmB	MRPL28	PRPL28
S17P	rpsQ	MRPS17	PRPS17	L29P	rpmC		
S18P	rpsR	MRPS18A,B,C	PRPS18	L30P	rpmD	MRPL30-1,2,3	
S19P	rpsS		PRPS19	L31P	rpmE		PRPL31
S20P	rpsT		PRPS20	L32P	rpmF	MRPL32	PRPL32
S21P	rpsU	MRPS21-1,2	PRPS21	L33P	rpmG	MRPL33-1,2	PRPL33
S22		MRPS22		L34P	rpmH	MRPL34	PRPL34
S23		MRPS23		L35P	rpmI	MRPL35-1,2	PRPL35
S24		MRPS24		L36P	rpmJ	MRPL36	
S25		MRPS25		L37		MRPL37	
S26		MRPS26		L38		MRPL38	
S27		MRPS27		L39		MRPL39-1,2	
S28		MRPS28		L40		MRPL40	
S29		MRPS29-1,2		L41		MRPL41	
S30		MRPS30		L42		MRPL42-1,2,3	
S31		MRPS31		L43		MRPL43-1,2,3,4	
S33		MRPS33-1,2		L44		MRPL44	
S34		MRPS34		L45		MRPL45	
S35		MRPS35		L46		MRPL46	
S36		MRPS36		L47		MRPL47-1,2	
PSRP-1			PSRP-1	L48		MRPL48	

RP name	*E. coli*	*H. sapiens* mitochondrion	*Ch. reinhardtii* chloroplast	RP name	*E. coli*	*H. sapiens* mitochondrion	*Ch. reinhardtii* chloroplast
PSRP-3			PSRP-3	L49		MRPL49	
PSRP-7			PSRP-7	L50		MRPL50	
L1P	rplA	MRPL1	PRPL1	L51		MRPL51	
L2P	rplB	MRPL2	PRPL2	L52		MRPL52-2	
L3P	rplC	MRPL3	PRPL3	L53		MRPL53	
L4P	rplD	MRPL4-1,2,3	PRPL4	L54		MRPL54	
L5P	rplE		PRPL5	L55		MRPL55-1-8	
L6P	rplF		PRPL6	L56		MRPL56-1,2	
L9P	rplI	MRPL9	PRPL9	PSRP-5			PSRP-5
L10P	rplJ	MRPL10-1,2	PRPL10	PSRP-6			PSRP-6
L11P	rplK	MRPL11-1,2,3	PRPL11	RAP38			RAP38
				RAP41			RAP41