

SEQUENCE LISTING

<110> Universitätsmedizin der Johannes Gutenberg-Universität

5 Mainz

<120> Vaccines for use in the prevention or treatment of leishmaniasis

<130> Leishmaniasis

10

<160> 5

<170> PatentIn version 3.5

15 <210> 1

<211> 9

<212> PRT

<213> Leishmania major

20 <400> 1

Cys Ala Gln Ala Asn Val Ser Leu Ile

1 5

25

<210> 2

<211> 807

<212> PRT

<213> Leishmania major

30

<400> 2

Met Ser Glu Ile Ser Phe Ser Glu Met Ser Leu His Glu Val Pro Leu

1 5 10 15

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Ala Ser Glu Ala Thr Pro Ser Ser Ala Val Val Leu Gly Gly Arg Thr

20 25 30

10 Asp Leu Arg Val Gly Asp Phe Val Gly Phe Gln Arg Ile Ser Pro Ser

35 40 45

Lys Glu Trp Lys Leu Ser Leu Gly Lys Val Ile Ala Leu Pro Thr Ala

15 50 55 60

Leu Thr Val Lys Val Ala His Phe Asp Ala Val Asn Glu Thr Thr Val

65 70 75 80

20

Thr Gln Asp Pro Ile Ser Glu Gln Met Val Arg Gln Lys Ala Ala Glu

85 90 95

25

Thr Gln Lys Met Asp Ile Trp His Asn Arg Glu Ala Leu Arg Glu Asn

100 105 110

30 Leu Ala Gln Glu Ser Ala Lys Glu Lys Ala Ala Thr Gln Arg Leu Leu

115 120 125

Ala Ala Arg Asp Gln Thr Val Thr Arg Gln Met Ala Thr Gly Asp Lys

130 135 140

5

Val Thr Ala Ser Leu Glu Asn Leu Asp Asn Ala Arg Arg Arg Leu Arg

145 150 155 160

10

Glu Val Pro Val Lys Glu Trp Gly Ala Leu Arg Ser Ser Tyr Leu Pro

165 170 175

15 Ser Ala Glu Ile Leu Gly Val Met Arg Ser Val Met Leu Ile Leu Tyr

180 185 190

Glu Asp Ser Val Thr Lys Trp Glu His Ile Gln Glu Val Met His Arg

20 195 200 205

Gln Asp Phe Met Glu Arg Ile Leu Gly Trp Asp Cys Thr Ala Thr Pro

210 215 220

25

Met Ser Leu Ser Arg Arg Lys Arg Ile Val Ala Leu Cys Ala Gly Lys

225 230 235 240

30

Asp Val Glu Gly Ala Pro Ser Lys Lys Leu His Pro Ser Gly Thr Arg

245 250 255

Ser Arg Ser Pro Ser Arg Pro Leu Val Val Ala Ala Lys Ser Thr Asn

5 260 265 270

Pro Ser Asn Val Val Ile Leu Asp Lys Asn Val Arg Thr Trp Ile Asn

275 280 285

10

Ala Gln Leu Ser Cys Ser Glu Ala Ala Arg Glu Gln Glu Met Met Ile

290 295 300

15

Asn Ser Cys Phe Ala Glu Gln Gln Glu Gln Arg Ala Leu Leu Arg Glu

305 310 315 320

20 Ile Asn Asp Met Arg Val Gly Ile Ser Thr Ile Glu Val Gln Met Leu

325 330 335

Glu Met Lys Asn Ala Ile Leu Gly Ile Asp Asp Ala Pro Arg Pro Ile

25 340 345 350

Met Pro Leu Asp Ala Tyr Pro Thr Asp Thr Thr Phe Tyr Lys Arg Thr

355 360 365

30

Tyr Pro Asp Ala Asp Gly Arg Phe Val Gln Glu Ile Ile Leu Arg Glu

370

375

380

5 Ala Val Ile Leu Asn Phe Gly Pro Ile Ala Glu Glu Asp Ala Glu Gly

385

390

395

400

Tyr Val Arg Leu Asn Ser Ala Gln Val Glu Arg Leu Arg Asp Ala Val

10

405

410

415

Val Ser Thr Asn Val Arg His Asp Ala Glu Glu Met Glu Glu Leu Leu

420

425

430

15

Ala Arg Lys Glu Arg Glu Glu Glu Glu Ile Ala Glu Leu Lys Ser Arg

435

440

445

20

Ile Ser Glu Leu Arg Asn Lys Val Ser Leu Thr Ala Glu Glu Glu Glu

450

455

460

25 Glu Leu Ala Gln Leu Glu Lys Leu Leu Ala Asp Ala Glu Arg Arg His

465

470

475

480

His Ala Thr Leu Ser Arg Ile Ala Asp Leu Tyr Ala Cys Gly Arg Gly

30

485

490

495

Ala Arg Glu Ile Thr Leu Ala Ile Lys Arg Pro Glu Phe Arg Tyr Thr

500

505

510

5

Arg Leu His Cys Lys Met Ser Gly Asp Trp Glu Thr Ile Leu Ser Asp

515

520

525

10

Ala Glu Arg Tyr Ser Glu Met Ile Ala Ala Phe Cys Asp Asp Val Ser

530

535

540

Thr Leu Leu Asn Ile Pro Ala Ser Tyr Val Leu Asp Ile Asp Thr Cys

15

545

550

555

560

Cys Gly Ser Leu Leu Ile Asp Phe Thr Val Lys His Ser Gly Asp Leu

565

570

575

20

Asp Asp Glu Gln Leu Gln Asp Leu Val Asn Lys Gly Cys Phe Ser Ala

580

585

590

25

Leu Cys Met Phe Tyr Glu Lys Val Thr Phe Lys Lys Thr Ser Pro Leu

595

600

605

30

Asn Thr Ser Gln Gln Gln Leu Ala Tyr Asp Leu Glu Gln Arg Leu Asn

610

615

620

Gly Pro Ala Pro Ile Ser Gly Met Gly Ile Lys Gln Ile Leu Thr Asp

625 630 635 640

5

Tyr Tyr Asn Ala Asp Gly Thr Leu Asp Glu Glu Phe Ser Asp Glu Val

645 650 655

10

Lys Ala His Lys Asp Tyr Arg Lys Ala Leu Ile Thr Ile Pro Pro Leu

660 665 670

15 Arg Glu Asp Tyr Asp Asp Val Thr Val Arg Gly Pro Phe Glu Gln His

675 680 685

Ala Glu Asp Glu Gly Glu Ala Leu Ser Ala Ala Val Pro Val Ser Ile

20 690 695 700

Met Ala Ser Ser Val Ala Gly Asn Arg Asn Lys Gly Glu Asp Glu Leu

705 710 715 720

25

Ala Gly Ala Thr Gln Thr Ser Ile Asp Leu Thr Asp Thr Gly Ala Ala

725 730 735

30

Thr His Asp Met Thr Glu Ser Ala Pro Ala Met Glu Val His Ser His

740 745 750

Asp Met Asn Leu Ser Tyr Asn Pro Gln Pro Ala Val Asp Ala Ala Ala

5 755 760 765

Pro Ala Ala Pro Ala Ala Pro Ser Val Ser Ala Pro Ala Glu Asn Val

770 775 780

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Gly Gln Pro Gly Val Pro Asn Thr Asp Ala Gly Ser Leu Ser Arg Ser

785 790 795 800

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Ser Glu Met Ser Arg Val Asn

805

20 <210> 3

<211> 723

<212> PRT

<213> Leishmania major

25 <400> 3

Met Gly Cys Cys Asn Ser Lys Glu Thr Lys Lys Pro Lys Glu Glu Val

1 5 10 15

30

Leu Gln Arg Glu Ala Gln Tyr Ala Lys Val Ser Ser Glu Thr Asp Ser

20 25 30

Val Glu Glu Gln Pro Asn Ile Glu Ala Arg Val Ala Ser Val Val Lys

5 35 40 45

Asp Leu Arg Ala Glu Arg Ile Asp Ala Ile Cys Ala His Ser His Ala

50 55 60

10

Cys Pro Tyr Arg Tyr Asn Ala Cys Thr Val Val Gly Gly Glu Val Lys

65 70 75 80

15

Phe Tyr Phe Glu Gly Gly Ile Ile Phe Cys Ile Val Lys Glu Gly Ser

85 90 95

20 Trp Tyr Ile Tyr Asn Asp Ser Leu Asp Tyr Glu Ala His Val Thr Val

100 105 110

Arg Phe Gly Pro Gly Ser Asn Ile Ala Ala Gly Gln Arg Ala Glu Leu

25 115 120 125

Gly Glu Val Glu Asp Gly Trp Thr Cys Ile Arg Ala Ile Val Tyr Pro

130 135 140

30

Leu Glu Thr Val His Leu Val Ser Gly Thr Ala Asn Gly Tyr Lys Thr

145 150 155 160

5 His Ile Thr Ile Lys Pro Leu Asn Glu Gln Tyr Arg His Glu Ala Cys

 165 170 175

Ala Ala Ala Asn Gly Thr Ala Glu Ala Glu Thr Glu Ala Val Arg Ser

10 180 185 190

Leu Val Thr Glu Gly Met Asp Glu Glu Ala Ile Leu His Arg Cys Val

 195 200 205

15

Glu Thr Thr Thr Pro Tyr Val Asp Leu Thr Phe Pro Pro Asn Gly Glu

 210 215 220

20

Ala Val Ala Arg Ala Gly Arg Asp Thr Arg Thr Ile Pro Glu Val Ala

225 230 235 240

25 Met Met Arg Pro Thr Gln Tyr Leu Leu Asp Asn Asn Cys Leu Ser Val

 245 250 255

Asn Asp Ile Cys Gly Pro Val Leu Ala Leu Ser Ile Glu Pro Gly Asn

30 260 265 270

Leu Gly Asp Ser Trp Phe Met Cys Ala Val Ala Ile Met Ala Glu Asn

275

280

285

5

Glu Ala Ala Val Arg Ser Ile Phe Ala Gln Gly Ser Pro Ala Glu Lys

290

295

300

10

Ala Val Gly Ala Tyr Arg Val Leu Val Asn Lys Asn Gly Trp Trp His

305

310

315

320

Thr Leu Ile Met Asp Asp Tyr Leu Pro Thr Phe Asn Arg Met Pro Val

15

325

330

335

Phe Ala Arg Ser Tyr Asp Asn Pro Ala Glu Val Trp Thr Ser Leu Leu

340

345

350

20

Gln Lys Ala Tyr Ala Lys Leu His Gly Ser Tyr Ala Ala Ile Thr Gly

355

360

365

25

Gly Asp Thr Leu Gln Ala Leu Ala Asp Leu Ser Gly Ala Pro Met Cys

370

375

380

30

Arg Phe Asp Lys Glu Trp Glu Glu Ala Thr Thr Asp Ala Glu Lys Ala

385

390

395

400

Asp Thr Leu Ala Asn Ala Leu Val Gln Phe Ser Arg Ser Gly Ala Cys

405

410

415

5

Val Val Leu Ser Thr Pro Gly His Asn Ser Glu Ser Tyr Leu Gly Arg

420

425

430

10

Ser Gln Ala Ser Asp Ala Ala Ala Phe Arg Ala Arg Tyr Lys Lys Val

435

440

445

15

Gly Leu His Val Gly Tyr Thr Tyr Ser Leu Glu Arg Val Val Met Val

450

455

460

Glu Glu Cys Gly Thr Leu Leu Phe Lys Val Arg Asn Pro Trp Arg Ser

20

465

470

475

480

Ser Ser Lys Trp Thr Gly Pro Trp Ser Tyr Gly Ser Arg Glu Trp Asp

485

490

495

25

Glu Asn Gln Asp Ala Cys Leu Leu Cys Gly Ala Gln Lys Asp Pro Gln

500

505

510

30

Asp Gly Ser Phe Trp Met Cys Trp Asp Asp Ala Ser Arg Tyr Phe Asp

515 520 525

Gly Gly Gly Val Leu Phe Ala Asn Pro Asp Ala Val Asp Tyr Arg Val

5 530 535 540

Lys Gly Val Phe Cys Lys Thr Ile Pro Ser Ala Val Leu Glu Ile Thr

545 550 555 560

10

Ala Ser Glu Ser Thr Gln Val Phe Phe Thr Leu Ser Gln Pro Asp Lys

565 570 575

15

Arg Gly Val Asp Arg Lys Glu Gly Ala Ala Leu Phe Ala Pro Ile Met

580 585 590

20 Leu Thr Val Ser Lys Glu Glu Asp Gly Val Gln Arg Val Gln Lys Asn

595 600 605

Thr Ser Trp Asn Pro Thr Met Pro Ser Glu Glu Phe Asn Phe Val Val

25 610 615 620

Gly Arg Asp Val Ser Met Trp Phe Thr Leu Gly Ala Glu Glu Lys Tyr

625 630 635 640

30

Leu Val Val Pro Arg Ile His Ser Lys Gly Val Lys Ser Asp Tyr Asp

645

650

655

5 Arg Pro Tyr Val Ile Ser Ile Met Ser Thr Asp Lys Leu Glu Gly Asn

660

665

670

Val Arg Val Glu Ala Lys His Ile His Ser Asp Ser Lys Val Phe Thr

10

675

680

685

Asn Tyr Ile Ala Tyr Asp Ser Glu Glu Leu Pro Ser Val Lys Val Glu

690

695

700

15

Asn Gln Val Arg Leu Pro Gly Lys Ala Pro Val Thr Tyr Val Ser Ala

705

710

715

720

20

Thr Val Ile

25 <210> 4

<211> 149

<212> PRT

<213> Leishmania major

30 <400> 4

Met Ala Asp Gln Leu Ser Asn Glu Gln Ile Ser Glu Phe Lys Glu Ala

1 5 10 15

5 Phe Ser Leu Phe Asp Lys Asp Gly Asp Gly Thr Ile Thr Thr Lys Glu

20 25 30

Leu Gly Thr Val Met Arg Ser Leu Gly Gln Asn Pro Thr Glu Ala Glu

10 35 40 45

Leu Gln Asp Met Ile Asn Glu Val Asp Gln Asp Gly Ser Gly Thr Ile

50 55 60

15

Asp Phe Pro Glu Phe Leu Thr Leu Met Ala Arg Lys Met Gln Asp Ser

65 70 75 80

20

Asp Ser Glu Glu Glu Ile Lys Glu Ala Phe Arg Val Phe Asp Lys Asp

85 90 95

25 Gly Asn Gly Phe Ile Ser Ala Ala Glu Leu Arg His Val Met Thr Asn

100 105 110

Leu Gly Glu Lys Leu Thr Asp Glu Glu Val Asp Glu Met Ile Arg Glu

30 115 120 125

Ala Asp Val Asp Gly Asp Gly Gln Ile Asn Tyr Glu Glu Phe Val Lys
 130 135 140

5

Met Met Met Ser Lys
 145

10 <210> 5
 <211> 453
 <212> PRT
 <213> Leishmania major

15 <400> 5

Met Ala Thr Ile Met Ser Glu His Val Val Lys Met Ala Lys Glu Phe
 1 5 10 15

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Val Asn Phe Met Asn Gln Ala Ile Thr Pro Phe His Ala Val Gln Thr
 20 25 30

25 Val Ala Lys Met Leu Lys Asp Ala Gly Tyr Thr Gln Leu His Glu Glu
 35 40 45

Lys Val Trp Pro Glu Leu Thr Pro Gly Gly Lys Tyr Tyr Leu Met Arg
 30 50 55 60

Asn Gly Thr Ser Ile Ile Ala Phe Ser Val Gly Gly Lys Phe Asp Pro

65 70 75 80

5

Met Asn Gly Val Lys Ile Val Gly Ala His Thr Asp Ser Pro Asn Phe

85 90 95

10 Leu Leu Lys Pro Arg Thr Lys Ser Thr Ala Ala Asp Tyr Glu Arg Val

100 105 110

Ala Val Gln Cys Tyr Gly Gly Gly Leu Trp His Ser Trp Phe Asp Arg

15 115 120 125

Asp Leu Thr Val Ala Gly Arg Val Met Ile Ser Arg Glu Arg Leu Glu

130 135 140

20

Gln Lys Ile Ile Lys Ile Asp Lys Pro Ile Met Arg Ile Pro Asn Leu

145 150 155 160

25

Ala Ile His Leu Thr Ser Ala Lys Asp Arg Glu Ser Phe Ser Pro Asn

165 170 175

30 Lys Glu Ser His Leu Ile Pro Ile Ile Ser Thr Gln Ile Ala Ala Arg

180 185 190

Ile Ala Glu Cys Asp Asp Lys Asp Ala Ser Asn Pro Asn His Cys Val

195 200 205

5

Ser Leu Ile Lys Ala Ile Ala Ser Val Ala Glu Cys Asn Pro Asp Glu

210 215 220

10

Ile Val Asp Phe Asp Leu Ser Val Ile Asp Thr Gln Pro Ala Val Ile

225 230 235 240

15 Gly Gly Ile His Asp Glu Phe Ile Phe Ser Pro Arg Leu Asp Asn Leu

245 250 255

Ile Ser Cys Tyr Cys Ala Val Lys Ala Ile Ile Glu Ala Asp Ala Leu

20 260 265 270

Glu Asn Asp Thr Met Met Arg Met Val Cys Leu Phe Asp His Glu Glu

275 280 285

25

Cys Gly Ser Ser Ser Ser Gln Gly Ala Ala Gly Ser Leu Val Pro Asp

290 295 300

30

Val Ile Glu His Ile Val Ser Asn Lys Thr Leu Arg Ala Thr Leu Val

305 310 315 320

Ala Asn Ser Phe Leu Leu Ser Val Asp Gly Ala His Gly Cys His Pro

5 325 330 335

Asn Tyr Ala Asp Lys His Glu Asn Ala His Arg Pro Ala Leu His Gly

340 345 350

10

Gly Pro Val Ile Lys Tyr Asn Ala Asn Ala Arg Tyr Ala Thr Asn Gly

355 360 365

15

Leu Thr Ala Ala Val Val Lys Asp Val Ala Lys Lys Ala Ala Ile Pro

370 375 380

20 Ile Gln Glu Phe Val Val Arg Asn Asp Ser Pro Cys Gly Ser Thr Ile

385 390 395 400

Gly Pro Ile Leu Ser Ser Leu Ser Gly Ile Lys Thr Ala Asp Ile Gly

25 405 410 415

Asn Pro Met Ile Ser Met His Ser Ile Arg Glu Met Cys Gly Thr Val

420 425 430

30

Asp Val Tyr Tyr Met Thr Lys Leu Ile Glu Ser Phe Phe Ile Asn Tyr

435

440

445

5 Gln Asn Pro His Glu

450