Supporting Information S2. The Independent dataset contains 150 anticancer peptides and 150 non-anticancer peptides (see Eq.2). None of the peptides in the independent dataset occurs in the benchmark dataset.

I. 150 anticancer peptides

>ACP_1

AAKKWAKAKWAKAK

>ACP 2

AAVPIVNLKDELLFPSWEALFSGSE

>ACP 3

AAWKWAWAKKWAKAKKWAKAA

>ACP 4

AIGSILGALAKGLPTLISWIKNR

>ACP_5

AKRHHGYKRKFH

>ACP_6

ALSKALSKALSKALSKALSK

>ACP_7

ALWKDILKNVGKAAGKAVLNTVTDMVNQ

>ACP_8

ALWKTMLKKLGTMALHAGKAALGAAADTISQGTQ

>ACP_9

AWKKWAKAWKWAKAKWWAKAA

>ACP_10

FAFAKIIAKIAKKII

>ACP_11

FAFGKGIGKIGKKGL

>ACP_12

FAKAIAKIAFGKGIGKVGKKLL

>ACP_13

FAKALAKLAKKLL

>ACP_14

FAKFLAKFLKKAL

>ACP 15

FAKIIAKIAKIAKKIL

>ACP_16

FAKKFAKKFKKFAKKFAKFAFAF

>ACP_17

FAKKLAKKAKLAKKL

>ACP 18

FAKKLAKKLKKLAKKLAKKWKL

>ACP_19

FAKKLAKKLKKLAKKLAKLALALKAL

FAKKLAKKLKKLAKKLIGAVLKV

>ACP_21

FAKKLAKLAKKALAL

>ACP_22

FAKKLAKLAKKLAKAL

>ACP_23

FAKKLAKLAKKAKLALAL

>ACP 24

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>ACP_25

FAKKLAKLALKLAKL

>ACP_26

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>ACP_27

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FAKLLAKAFKKAL

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FAKLLAKALKKAL

>ACP 31

FAKLLAKALKKFAL

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>ACP_36

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>ACP_37

FAKLLFKALKKAL

>ACP_38

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>ACP_39

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>ACP_40

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>ACP_41

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FALAKALKKAL

>ACP_43

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>ACP_141

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>ACP_142

MWKWFHNVLSSWQLLADKRPARDYNRK

>ACP 143

NKWKKILGKIIKVVK

>ACP_144

NYHNRTVEVRTLKSFSTLANNFVLIVSQLQPSQENEMFSIRGDSAHRRFLLFRRAFKQLDV

EAAL

>ACP 145

PDEDAINDALNKVCSTGRRQRSICKQLLKK

>ACP_146

PEWFKCRRWQWRMKKLGA

>ACP_147

RGDLLRHVVKILEKYL

>ACP_148

RKAFRWAWRMLKKAAPSITCVR

>ACP_149

RWGKWFKKATHVGKHVGKAALTAYL

>ACP_150

SWLSKTAKKLENSAKKRISEGIAIAIQGGPR

II. 150 non-anticancer peptides

>non-ACP 1

 $\label{eq:aaepp} \textbf{AAEFPDFYDSEEQMGPHQEAEDEKDRADQRVLTEEEKKELENLAAMDLELQKIAEKFSQR}$

>non-ACP_2

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>non-ACP 3

ACNFQSCWATCQAQHSIYFRRAFCDRSQCKCVFVRG

>non-ACP 4

ACYCRIGACVSGERLTGACGLNGRIYRLCCR

>non-ACP 5

AEVAPAPAAAAPAKAPKKKAAAKPKKAGPS

>non-ACP_6

>non-ACP 7

AGANDLCQECEDIVHLLTKMTKEDAFQDTIRKFLEQECDILPLKLLVPRCRQVLDVYLPLV IDYFQGQIKPKAICSHVGLC

>non-ACP_8

AGDPLADPNSQIVRQIMSNAAWGPPLVPERFRGMAVGAAGGVTQTVLQGAAAHMPVNV PIPKVPMGPSWNGSKG

>non-ACP_9

ALPKKLKYLNLFNDGFNYMGVV

>non-ACP 10

ALSILKGLEKLAKMGIALTNCKATKKC

>non-ACP_11

ALWKDILKNAGKAALNEINQLVNQ

>non-ACP 12

ANTAFVSSAHNTQKIPAGAPFNRNLRAMLADLRQNAAFAG

>non-ACP_13

APPGARPPPGPPPPGP

>non-ACP_14

AQRCGDQARGAKCPNCLCCGKYGFCGSGDAYCGAGSCQSQCRGCR

>non-ACP_15

ATAVDFGPHGLLPIRPIRIRPLCGKDKS

>non-ACP_16

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>non-ACP_17

ATCDLLSGIGVQHSACALHCVFRGNRGGYCTGKGICVCRN

>non-ACP_18

ATCDLLSGTGINHSACAAHCLLRGNRGGYCNGKAVCVCRN

>non-ACP_19

ATCDLLSMWNVNHSACAAHCLLLGKSGGRCNDDAVCVCRK

>non-ACP 20

ATCYCRTGRCATRESLSGVCEISGRLYRLCCR

>non-ACP_21

ATPATPTVAQFVIQGSTICLVC

>non-ACP 22

ATRVVYCNRRSGSVVGGDDTVYYEG

>non-ACP_23

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>non-ACP 24

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>non-ACP_25

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>non-ACP 26

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>non-ACP_28

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>non-ACP_29

>non-ACP 30

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>non-ACP_31

>non-ACP_32

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>non-ACP_33

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>non-ACP_34

DLRFWNPREKLPLPTLPPFNPKPIYIDMGNRY

>non-ACP_35

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>non-ACP 36

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>non-ACP_37

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>non-ACP_38

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>non-ACP_40

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>non-ACP 41

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>non-ACP 42

ENFFKEIERAGQRIRDAIISAAPAVETLAQAQKIIKGGD

>non-ACP 43

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>non-ACP_44

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>non-ACP 45

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>non-ACP 46

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>non-ACP 47

FFSASCVPGADKGQFPNLCRLCAGTGENKCA

>non-ACP 48

FGLPMLSILPKALCILLKRKC

>non-ACP_49

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>non-ACP_50

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A

>non-ACP_51

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>non-ACP 52

GFGCPLDQMQCHRHCQTITGRSGGYCSGPLKLTCTCYR

>non-ACP_53

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>non-ACP_56

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>non-ACP_57

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>non-ACP_58

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>non-ACP_59

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>non-ACP_60

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>non-ACP 61

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>non-ACP 62

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>non-ACP_63

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>non-ACP_64

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>non-ACP_65

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>non-ACP_66

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>non-ACP 67

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>non-ACP_68

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>non-ACP_69

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>non-ACP_70

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>non-ACP_71

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>non-ACP_72

GLLSRLRDFLSDRGRRLGEKIERIGQKIKDLSEFFQS

>non-ACP_73

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>non-ACP 74

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>non-ACP_75

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>non-ACP_76

GLVSSIGRALGGLLADVVKSKEQPA

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>non-ACP_78

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>non-ACP_79

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>non-ACP_80

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>non-ACP_81

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>non-ACP_82

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>non-ACP 83

GSNFCDSKCKLRCSKAGLADRCLKYCGICCEECKCVPSGTYGNKHECPCYRDKKNSKGK

SKCP

>non-ACP_84

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>non-ACP 85

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>non-ACP 86

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>non-ACP 87

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>non-ACP_90

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>non-ACP 91

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>non-ACP_92

GVITDALKGAAKTVAAELLRKAHCKLTNSC

>non-ACP_93

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>non-ACP_94

GVLDILTGAGKDLLAHALSKLSEKV

>non-ACP_95

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>non-ACP_96

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>non-ACP_97

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MSVYFTNEQIKEIHDAATACDPEAHHEHDH

>non-ACP_98

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>non-ACP_99

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>non-ACP_100

HVDKKVADKVLLLKQLRIMRLLTRL

>non-ACP_101

IFGAILPLALGALKNLIK

>non-ACP_102

IIEKLVNTALGLLSGL

>non-ACP_103

IIGLVSKGTCVLVKTVCKKVLKQG

>non-ACP_104

IKITTMLAKLGKVLAHV

>non-ACP_105

ILENLLARSTNEDREGSIFDTGPIRRPKPRPRPRPEG

>non-ACP_106

ITCQQVTSELGPCVPYLTGQGIP

>non-ACP_107

IYWIADQFGIHLATGTARKLLDAMASGASLGTAFAAILGVTLPAWALAAAGALGATAA

>non-ACP_108

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RTVE

>non-ACP_110

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>non-ACP_111

KQQLATEAESAGPIL

>non-ACP_112

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>non-ACP_113

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>non-ACP_114

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>non-ACP_115

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>non-ACP_116

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>non-ACP_117

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NCCRRMFSHYRTS

>non-ACP_118

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AW

>non-ACP_119

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>non-ACP 120

LPVNEAQCRQVGGYCGLRICNFPSRFLGLCTRNHPCCSRVWV

>non-ACP_121

LQDAALGWGRRCPQCPRCPSCPSCPRCPRCPRCKCNPK

>non-ACP_122

LRVRLASHLRKLRKRLLRDADDLQKRLAVY

>non-ACP_123

LSCKRGTCHFGRCPSHLIKGSCSGG

>non-ACP_124

LTCEIDRSLCLLHCRLKGYLRAYCSQQKVCRCVQ

>non-ACP 125

MDSNKDERAYAQWVIIILHNVGSSPFKIANLGLSWGKLYADGNKDKEV

>non-ACP_126

MHDFWVLWVLLEYIYNSACSVLSATSSVSSRVLNRSLQVKVVKITN

>non-ACP 127

MINRTDCNENSYLEIHNNEGRDTLCFANAGTMPVAIYGVNWVESGNNVVTLQFQRNLSD PRLETITLQKWGSWNPGHIHEILSIRIY

>non-ACP_128

MKTFSVAVAVAIVLAFICTQESSALPVTGVEELVELVSSDDPVADHQELPVELGERLFNIRK KRASPKCTPYCYPTRDGVFCGVRCDF

>non-ACP_129

 ${\tt MKTFSVAVAVAVVLAFICTQESSALPVTGIEELVEPVSSDNNDNHQGLPVELRERLVNIRKK} \\ {\tt RAPTDCIPYCYPTGDGFHCGVTCRF}$

>non-ACP 130

MLAKIKAMIKKFPNPYTLAAKLTTYEINWYKQQYGRYPWERPVA

>non-ACP_131

MNFNKLFVFVALVLAVCIGQSEAGWLKKIGKKIERVGQHTRDATIQTIGVAQ

>non-ACP_132

 $\label{lem:main} \mbox{MRILYLLFSVLFLVLQVSPGLSLPQRDMFLCRIGSCHFGRCPIHLVRVGSCFGFRSCCKSPW} \mbox{DV}$

>non-ACP_133

PDEDAINDALNKVCSTGRRQRSICKQLLKK

>non-ACP_134

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>non-ACP_135

SKYGGECSVEHNTCTYLKGGKDHIVSCPSAANLRCKTERHHCEYDEHHKTVDCQTPV

>non-ACP_136

 ${\tt SLQGGAPNFPQPSQQNGGWQVSPDLGRDDKGNTRGQIEIQNKGKDHDFNAGWGKVIRGPNKAKPTWHVGGTYRR}$

>non-ACP_137

 ${\bf SLQPGAPNVNNKDQPWQVSPHISRDDSGNTRTDINVQRHGENNDFEAGWSKVVRGPNK} \\ {\bf AKPTWHIGGTHRW}$

>non-ACP_138

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>non-ACP 139

VLLFLFQAAPGSADAPFADTAACRSQGNFCRAGACPPTFAASGSCHGGLLNCCAK

>non-ACP_140

VNYGNGVSCSKTKCSVNWGQAFQERYTAGINSFVSGVASGAGSIGRRP

>non-ACP_141

VQETQKLAKTVGANLEETNKKLAPQIKSAYDDFVKQAQEVQKKLHEAASKQ

>non-ACP_142

VSCTCRRFSCGFGERASGSCTVNGVRHTLCCRR

>non-ACP_143

VTCDILSVEAKGVKLNDAACAAHCLFRGRSGGYCNGKRVCVCR

>non-ACP_144

VTCDLLSFEAKGFAANHSLCAAHCLAIGRRGGSCERGVCICRR

>non-ACP_145

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>non-ACP_146

VTSWSLCTPGCTSPGGGSNCSFCC

>non-ACP_147

WNPFKELERAGQRVRDAIISAGPAVATVAQATALAK

>non-ACP_148

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>non-ACP_149

YRQSMNNFQGLRSFGCRFGTCTVQKLAHQIYQFTDKDKDNVAPRSKISPQGY

>non-ACP_150

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