

Claims

1. A two-part ~~system/device~~ forming a combined eAPC:eTPC analytical system, wherein a first part is an **engineered antigen-presenting cell system (eAPCS)**, and a second part is an **engineered TCR-presenting cell system (eTPCS)**,

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wherein said eAPCS comprises

a first component which is an **engineered antigen-presenting cell (eAPC)**, **designated component 1A**, wherein component 1A lacks endogenous surface expression of at least one family of analyte antigen presenting complexes (aAPX) and/or analyte antigenic molecules (aAM) and contains a second component **designated component 1B**, a **synthetic** genomic receiver site, for re-combinase mediated cassette exchange (RMCE) integration of one or two ORFs encoding an aAPX and/or an aAM, and

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a third component which is a genetic donor vector **designated component 1C**, for delivery and integration into 1B of ORF encoding said aAPX and/or said aAM, wherein said aAPX and/or said aAM belong to the at least one family of aAPX and/or aAM for which component 1A lacks endogeneous surface expres-

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sion, wherein component 1C is matched to component 1B, and wherein component 1C is designed to deliver one or two ORFs encoding an aAPX and/or an aAM

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~~and wherein said one or two ORFs optionally also encodes a selection marker of integration, such that the aAPX and/or aAM can be expressed by component 1A,~~

and wherein -

~~2. A two-part device according to claim 1 wherein said eTPCS comprises~~

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a first component, which is an engineered TCR-presenting cell (eTPC), **designated component 2A**, wherein component **2A** lacks endogenous surface expression of at least one family of analyte antigen-presenting complexes (**aAPX**) and/or analyte antigenic molecule (**aAM**) from which said aAPX and/or said aAM encoded by the ORF in component 1C belong to, lacks endogenous expression of TCR chains alpha, beta, delta and gamma, and expresses CD3 proteins which are conditionally presented on the surface of the cell only when the cell expresses a complementary pair of TCR chains and contains a second component **designated 2B**, a genomic receiver site for recombinase mediated cassette exchange (RMCE) integration of a single ORF encoding at least one analyte TCR chain of alpha, beta, delta or gamma, and/or two ORFs encoding a pair of analyte TCR chains, and a third component is a genetic donor vector, **designated component 2C**, for delivery of ORF encoding analyte TCR chains, wherein **component 2C**, is matched to component **2B**, and wherein the component **2C** is designed to deliver

- a. A single ORF encoding at least one analyte TCR chain of alpha, beta, delta and/or gamma and/or
- b. Two ORFs encoding a pair of analyte TCR chains-
and wherein a and/or b optionally encodes a selection marker of integration, such that the analyte TCR chains can be expressed as TCR surface protein in complex with the CD3 (**TCRsp**) on component **2A**.

23. A two-part system device according to **claim 1 or 2** wherein **eAPCS** comprises ~~provides~~ the one or more of analyte eAPC selected from at least one of:-

- a. eAPC-p,
- b. eAPC-a,
- c. eAPC-pa, and
- d. a library of a, -b or c.

34. A two-part system device according to **claim 23**, wherein an eAPC-p, eAPC-a or eAPC-pa can expresses an **analyte antigen** selected from

e.~~a.~~ an aAPX or

f.~~b.~~ an aAM or

g.~~c.~~ an aAPX:aAM or

h.~~d.~~ an aAPX:CM or

5 i.~~e.~~ a combination thereof.

45. A two-part system device according to any of the previous claims wherein **eTPCS** comprises ~~provides~~ one or more analyte eTPC selected from

a. eTPC-t and

b. a library thereof.

10 56. A two-part system device according to claim 45, comprising wherein an analyte eTPC, which can express an analyte pair of TCR chains ~~are expressed as~~ TCR surface proteins in complex with CD3 (analyte **TCRsp**) ~~by an analyte eTPC~~.

67. A two-part system device according to claim 56, wherein the eTPC contains a component 2F, representing a synthetic TCR signal response element engineered to the
15 genome of the eTPC, and which is used to report the formation of complex between analyte TCRsp and an analyte antigen presented by eAPC -p, -a or -pa, and which results in a signal response in the eTPC.

78. Use of a A two-part system device as defined in according to any of the preceding claims, wherein said use comprises combining one or more analyte eAPC, ~~is combined~~
20 ~~with~~ one or more analyte eTPC.

89. Use A two-part device according to claim 78, wherein the combination results in a contact between an analyte TCRsp and an analyte antigen as defined in claim 43, wherein the contact results ~~may or may not result~~ in a signal response.

910. Use A two-part device according to claim 89, wherein the contact ~~may results~~ in
25 the formation of a complex between the analyte TCRsp and the analyte antigen.

101. Use A two-part device according to claim 910 wherein thea formation of a complex, ~~if any, can~~ induces a signal response in the analyte eTPC ~~and/or~~ the analyte eAPC.

~~112. Use A two-part device according to any of claims 7-98-10 for selecting, wherein the signal response is used to select an analyte eTPC or a pool of analyte eTPC, with or without a signal response and/or analyte eAPC or a pool of analyte eAPC using the with or without a signal response.~~