

Claims

1. A two-part device, wherein a first part is an **engineered antigen-presenting cell system (eAPCS)**, and a second part is an **engineered TCR-presenting cell system (eTPCS)**.
- 5 2. A two-part device according to **claim 1** wherein **eAPCS** provides the one or more of analyte eAPC selected from
 - a. eAPC-p and/or
 - b. eAPC-a, and/or
 - c. eAPC-pa, and/or
 - 10 d. one or more libraries of a and/or b and/or c.
3. A two-part device according to **claim 2**, wherein an eAPC-p, eAPC-a or eAPC-pa expresses an **analyte antigen** selected from
 - a. an aAPX or
 - b. an aAM or
 - 15 c. an aAPX:aAM or
 - d. an aAPX:CM or
 - e. a combination thereof.
4. A two-part device according to **claim 1 or 2** wherein **eTPCS** provides one or more analyte eTPC selected from
 - 20 a. eTPC-t and/or
 - b. one or more libraries thereof.
5. A two-part device according to claim 4, wherein an analyte pair of TCR chains are expressed as TCR surface proteins in complex with CD3 (analyte **TCRsp**) by an analyte eTPC.

- 5 6. A two-part device according to claim 5, wherein the eTPC contains a component 2F, representing a synthetic TCR signal response element engineered to the 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.
7. A two-part device according to any of the preceding claims, wherein one or more analyte eAPC, is combined with one or more analyte eTPC.
- 10 8. A two-part device according to **claim 7**, wherein the combination results in a contact between an analyte TCRsp and an analyte antigen as defined in claim 3, wherein the contact may or may not result in a signal response.
9. A two-part device according to **claim 8**, wherein the contact may result in the formation of a complex between the analyte TCRsp and the analyte antigen.
10. A two-part device according to **claim 9** wherein a formation of a complex, if any, can induce a signal response in the analyte eTPC and/or the analyte eAPC.
- 15 11. A two-part device according to any of claims 7-9, 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 with or without a signal response.
- 20 12. An analyte eTPC obtained from the two-part device according to any of **the preceding claims** for use in characterisation of a signal response of the analyte eTPC, expressing analyte **TCRsp**, to an **analyte antigen**.
- 25 13. A method for selecting one or more eTPC from an input analyte eTPC or a library of analyte eTPC, to obtain one or more analyte eTPC wherein the expressed TCRsp binds to one or more analyte antigen as defined in claim 3, wherein the method comprises
- 30 a. Combining one or more analyte eTPC with one or more analyte eAPC resulting in a contact between an analyte TCRsp with an analyte antigen and at least one of
- b. Measuring a formation, if any, of a complex between one or more analyte TCRsp with one or more analyte antigen and/or

- 5 c. Measuring a signal response by the analyte eTPC, if any, induced by the formation of a complex between one or more analyte TCRsp with one or more analyte antigen and/or
- d. Measuring a signal response by the analyte eAPC, if any, induced by the formation of a complex between one or more analyte TCRsp with one or more analyte antigen and
- e. Selecting one or more eTPC based on step b, c and/or d wherein the selection is made by a positive and/or negative measurement.
- 10 14. A method according to claim **13** wherein the selection step e is performed by single cell sorting and/or cell sorting to a pool.
15. A method according to **claim 14** wherein the sorting is followed by expansion of sorted single cell.
16. A method according to **claim 14** wherein the sorting is followed by expansion of sorted pool of cells.
- 15 17. A method according to any of **claims 13, 14, 15, 16**, wherein the selected eTPC is subjected to characterisation of the signal response wherein the method further comprises
- a. Determining a native signalling response and/or
- b. Determining a synthetic signalling response, if the eTPC contains component 2F
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18. An eAPC, obtained from the two-part device as defined in claims 1 to 11 to identify the analyte antigen that induces a signal response of one or more analyte eTPC expressing an analyte **TCRsp** to the expressed **analyte antigen**.
19. A method for selecting one or more **eAPC** from an input **analyte eAPC** or a library of **analyte eAPC**, to obtain one or more analyte eAPC that induces a signal response of one or more analyte eTPC expressing an analyte **TCRsp** to the expressed **analyte antigen** as defined in **claim 3**, wherein the method comprises
- 25 a. Combining one or more analyte eAPC with one or more analyte eTPC,

resulting in a contact between an analyte antigen presented by the analyte eAPC with analyte TCRsp of one or more analyte eTPC and

- b. Measuring a formation, if any, of a complex between one or more analyte antigen with one or more analyte TCRsp and/or
 - 5 c. Measuring a signal response in the one or more analyte eTPC, if any, induced by the formation of a complex between the analyte TCRsp with the analyte antigen and/or
 - d. Measuring a signal response, if any, by the analyte eAPC induced by the formation of a complex between one or more analyte TCRsp with
10 one or more analyte antigen and
 - e. Selecting one or more eAPC from step b, c and/or d wherein the selection is made by a positive and/or negative measurement.
20. A method according claim 19 wherein the selection step e is performed by single cell sorting and/or cell sorting to a pool.
- 15 21. A method according to **claim 20** wherein the sorting is followed by expansion of the sorted single cell.
22. A method according to **claim 21** wherein the sorting is followed by expansion of the sorted pool of cells.