Modular Nucleic Acid Assembled p/MHC Microarrays for Multiplexed Sorting of Antigen-Specific T Cells - DTU Orbit (17/10/2018)

Modular Nucleic Acid Assembled p/MHC Microarrays for Multiplexed Sorting of Antigen-Specific T Cells

The human immune system consists of a large number of T cells capable of recognizing and responding to antigens derived from various sources. The development of peptide-major histocompatibility (p/MHC) tetrameric complexes has enabled the direct detection of these antigen-specific T cells. With the goal of increasing throughput and multiplexing of T cell detection, protein microarrays spotted with defined p/MHC complexes have been reported, but studies have been limited due to the inherent instability and reproducibility of arrays produced via conventional spotted methods. Herein, we report on a platform for the detection of antigen-specific T cells on glass substrates that offers significant advantages over existing surface-bound schemes. In this approach, called "Nucleic Acid Cell Sorting (NACS)", single-stranded DNA oligomers conjugated site-specifically to p/MHC tetramers are employed to immobilize p/MHC tetramers via hybridization to a complementary-printed substrate. Fully assembled p/MHC arrays are used to detect and enumerate T cells captured from cellular suspensions, including primary human T cells collected from cancer patients. NACS arrays outperform conventional spotted arrays assessed in key criteria such as repeatability and homogeneity. The versatility of employing DNA sequences for cell sorting is exploited to enable the programmed, selective release of target populations of immobilized T cells with restriction endonucleases for downstream analysis. Because of the performance, facile and modular assembly of p/MHC tetramer arrays, NACS holds promise as a versatile platform for multiplexed T cell detection.

General information
State: Published
Organisations: California Institute of Technology, Netherlands Cancer Institute
Number of pages: 9
Pages: 9695-9703
Publication date: 2009
Peer-reviewed: Yes

Publication information
Journal: JOURNAL OF THE AMERICAN CHEMICAL SOCIETY
Volume: 131
Issue number: 28
ISSN (Print): 0002-7863
Ratings:
BFI (2018): BFI-level 2
Web of Science (2018): Indexed yes
BFI (2017): BFI-level 2
Scopus rating (2017): CiteScore 14.05 SJR 8.127 SNIP 2.641
Web of Science (2017): Impact factor 14.357
Web of Science (2017): Indexed yes
BFI (2016): BFI-level 2
Scopus rating (2016): CiteScore 13.18 SJR 7.492 SNIP 2.596
Web of Science (2016): Impact factor 13.858
Web of Science (2016): Indexed yes
BFI (2015): BFI-level 2
Scopus rating (2015): CiteScore 12.81 SJR 6.775 SNIP 2.63
Web of Science (2015): Impact factor 13.038
Web of Science (2015): Indexed yes
BFI (2014): BFI-level 2
Scopus rating (2014): CiteScore 11.92 SJR 6.294 SNIP 2.587
Web of Science (2014): Impact factor 12.113
Web of Science (2014): Indexed yes
BFI (2013): BFI-level 2
Scopus rating (2013): CiteScore 11.38 SJR 5.993 SNIP 2.466
Web of Science (2013): Impact factor 11.444
ISI indexed (2013): ISI indexed yes
Web of Science (2013): Indexed yes
BFI (2012): BFI-level 2
Scopus rating (2012): CiteScore 10.37 SJR 6.211 SNIP 2.38
Web of Science (2012): Impact factor 10.677
ISI indexed (2012): ISI indexed yes
Web of Science (2012): Indexed yes
BFI (2011): BFI-level 2
Scopus rating (2011): CiteScore 9.94 SJR 5.478 SNIP 2.321
Web of Science (2011): Impact factor 9.907
ISI indexed (2011): ISI indexed yes
Web of Science (2011): Indexed yes
BFI (2010): BFI-level 2
Scopus rating (2010): SJR 5.167 SNIP 2.138
Web of Science (2010): Impact factor 9.023
Web of Science (2010): Indexed yes
BFI (2009): BFI-level 2
Web of Science (2009): Indexed yes
BFI (2008): BFI-level 2
Scopus rating (2008): SJR 5.06 SNIP 2.16
Web of Science (2008): Indexed yes
Web of Science (2007): Indexed yes
Scopus rating (2006): SJR 4.662 SNIP 2.252
Web of Science (2006): Indexed yes
Scopus rating (2005): SJR 4.413 SNIP 2.223
Web of Science (2005): Indexed yes
Scopus rating (2004): SJR 3.841 SNIP 2.203
Web of Science (2004): Indexed yes
Scopus rating (2003): SJR 3.421 SNIP 2.236
Web of Science (2003): Indexed yes
Scopus rating (2002): SJR 3.223 SNIP 2.345
Web of Science (2002): Indexed yes
Scopus rating (2001): SJR 3.506 SNIP 2.15
Web of Science (2001): Indexed yes
Scopus rating (2000): SJR 3.972 SNIP 2.163
Web of Science (2000): Indexed yes
Scopus rating (1999): SJR 3.438 SNIP 2.133

Original language: English
Keywords: Biochemistry, Chemotherapy, Colloid and Surface Chemistry, Cancer patients, Cell sorting, Direct detection, Glass substrates, Human immune systems, Inherent instability, Modular assembly, Primary human T cells, Printed substrate, Protein microarray, Reproducibility, Restriction endonucleases, Single-stranded DNA, T cells, Tetramer, Tetrameric complex, Tetramers, Amines, Antigens, Bioassay, Biochips, Cell membranes, Cellular arrays, DNA, DNA sequences, Genes, Multiplexing, Nucleic acids, Oligomers, Substrates, Cytology, antigen, oligomer, peptide, restriction endonuclease, single stranded DNA, tetramer, antigen specificity, article, cancer patient, cell selection, cell suspension, conjugation, DNA hybridization, DNA microarray, DNA sequence, human, human cell, immobilization, immobilized cell, major histocompatibility complex, surface property, T lymphocyte, Animals, Base Sequence, Cell Line, Cell Separation, Cytological Techniques, DNA Restriction Enzymes, DNA, Complementary, DNA, Single-Stranded, Glass, Histocompatibility Antigens, Humans, Immobilized Proteins, Mice, Nucleic Acid Hybridization, Protein Array Analysis, Protein Multimerization, Protein Structure, Quaternary, Receptors, Antigen, T-Cell, Reproducibility of Results, Streptavidin, Substrate Specificity, T-Lymphocytes, 9013-20-1 Streptavidin, EC 3.1.21.- DNA Restriction Enzymes, ANTIGENS, CHEMISTRY, CLASS-I LIGANDS, ENGINEERED LYMPHOCYTES, CANCER REGRESSION, ESCHERICHIA-COLI, MELANOMA ANTIGEN, FLOW-CYTOMETRY, MHC TETRAMERS, IMMOBILIZATION, PROTEINS, Primates Mammalia Vertebrata Chordata Animalia (Animals, Chordates, Humans, Mammals, Primates, Vertebrates) - Hominidae [86215] human common, antigens, complementary-printed substrate, glass substrates, modular nucleic acid, peptide-major histocompatibility tetrameric complexes, restriction endonuclease 9075-08-5 EC 3.1.21.3, single-stranded DNA oligomers, 10060, Biochemistry studies - General, 24003, Neoplasms - Immunology, 24004, Neoplasms - Pathology, clinical aspects and systemic effects, 34502, Immunology - General and methods, 34508, Immunology - Immunopathology, tissue immunology, Biochemistry and Molecular Biophysics, Clinical Immunology, Methods and Techniques, Oncology, cancer Neoplasms (MeSH) neoplastic disease, cellular suspension, facile assembly, homogeneity, modular assembly, repeatability, surface-bound scheme, versatility, Human Medicine, Medical Sciences, antigen-specific T-cells immune system, downstream analysis laboratory techniques, nucleic acid cell sorting NACS laboratory techniques, protein