OMAP-N: Organ Mapping Antibody Panel (OMAP) for Multiplexed Antibody-Based Imaging of Human <insert organ name> with <technology>, <insert version>

OMAP authors should indicate the number of anatomical structures (AS), cell types (CT), and protein biomarkers (BP) profiled by their OMAP in Table 1.

Table 1. Anatomical structures, cell types and protein biomarkers for each OMAP (To appear on HRA portal OMAP Overview page).

|  |  |  |
| --- | --- | --- |
| Anatomical Structures (AS) | Cell Types (CT) | Protein Biomarkers (BP) |
| Insert # | Insert # | Insert # |

OMAP authors should insert a short paragraph of text (up to 300 words) with the following information outlined in Table 2.

Table 2. Information to include in OMAP Description Document (300 words or less).

| **Order in paragraph** **(Inclusion: Required or Optional)** | **Description** | **Example** |
| --- | --- | --- |
| 1 (Required) | Include OMAP name, multiplexed imaging method, and tissue preservation method with protocols and publications DOIs (up to 3 for this field). If applicable, reference landmark study employing this OMAP. | OMAP-5 was designed for Secondary Ionization Mass Spectrometry (SIMS) imaging of fresh frozen human liver samples (https://doi.org/10.1101/2022.09.26.508878). |
| 2 (Required) | Specify the number of antibodies included in your OMAP and the nuclear marker used for image alignment, if applicable. | The panel contains 54 antibodies and the nuclear marker Hoechst for image alignment and nuclear segmentation. |
| 3 (Required) | Highlight overlap with ASCT+B tables and include link to organ-specific ASCT+B table (see Section 6b of OMAP SOP for detailed instructions). | This OMAP provides a spatial context for all anatomical structures and most cell types present in the ASCT+B lung table v1.1. |
| 4 (Optional)  | Discuss other OMAPs or multiplexed imaging studies relevant to your organ. Please include DOIs to existing OMAPs or closely related studies. | This OMAP builds from OMAP-1 (link to DOI) and additionally includes: [list markers]. The core and essential protein biomarkers detailed here overlap (>40%) with a panel developed for multiplexed imaging of kidney samples using imaging mass cytometry (IMC) (10.1172/jci.insight.129477). |
| 5 (Required) | Discuss key cells that are missing from OMAP due to the lack of suitable reagents, if known. | Acinar and epsilon cells are not targeted in the existing panel due to the complexity of finding suitable antibodies. |
| 6 (Optional) | Highlight specific application of OMAP, if any, besides mapping healthy tissues. | The inclusion of protein biomarkers DDB2 and p53 allow profiling of skin damage and aging effects. |
| 7 (Optional) | Discuss the analytical pipeline and markers used for downstream image analysis, if applicable, with DOIs for relevant publications (up to 3 for this field). | Object-based cellular segmentation was performed using a convolutional neural network (CNN)-based approach with Mask R-CNN architecture and ResNet-50 as a backbone. As an input three channels were used: Hoechst for nuclei, CD45 as a base membrane, and composite of several other membrane markers (CD138, CD163, CD94, CD69, CD8, CD4) (https://doi.org/10.1101/2022.06.03.494716). |
| 8 (Required) | Include links to relevant protocols, accompanying datasets, and other resources, e.g., validated antibody repository for your method (up to 3 for this field). | Additional details on sample preparation, antigen retrieval, and the Cell DIVE method can be found here (Protocols.io DOI). Representative datasets using this OMAP can be found here (Public repository DOI, e.g., 10.5281/zenodo.5244551). See (web link or DOI) for antibodies validated for this method. |
| 9 (Required for FFPE samples) | Include the method (buffer, temperature, time, device) used for antigen retrieval and link to a detailed protocol or publication. | Following antigen retrieval (citrate buffer pH=6, heating at high pressure 114-121°C for 20 minutes), tissue autofluorescence was reduced using a photobleaching protocol (https://doi.org/10.1038/s41596-019-0206-y, modified by Derek Oldrige). |
| 10 (Optional) | Discuss any custom conjugations or special detection methods, if applicable. | Protein targets were detected using either primary antibodies with fluorophore-labeled secondaries or fluorescent dye-conjugated antibodies. Several targets required custom conjugation to unique fluorophores by commercial suppliers or antibody conjugation kits (e.g., AF532, Thermo A20182). |
| 11 (Required) | If applicable, note if an antibody should be placed in an earlier cycle to avoid loss of immunogenicity with cycle number. | Antibodies directed against CD106 (RRID: [AB\_314561](https://scicrunch.org/resolver/AB_314561)) are known to perform better in cycle 1 than in later cycles.  |
| 12 (Required)By December 2023 | Include a link to a PDF with Antibody Validation Reports (AVRs) for each antibody included in your OMAP.  | AVRs for each antibody in OMAP can be found here (PDF). |

In Table 3 below, please only add information to the blue fields in the label column.

|  |  |
| --- | --- |
| LABEL | VALUE |
| Creator(s): | This should correspond to Row 3 of the OMAP table metadata rows. |
| Creator(s) ORCID: | This should correspond to Row 4 of the OMAP table metadata rows. 0000-0000-0000-0000 |
| Project Lead(s):  | Andrea J. Radtke, Katy Börner, Neil Kelleher, Ronald N. Germain  |
| Project Lead ORCID(s): | 0000-0003-4379-8967, 0000-0002-3321-6137, 0000-0002-8815-3372, 0000-0003-1495-9143 |
| Creation Date: | Date the HRA release occurs; authors leave blank |
| License: | Creative Commons Attribution 4.0 International |
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| Funder: | Intramural Research Program of the NIH, National Institute of Allergy and Infectious Disease and National Cancer Institute |
| Award Number(s): | UH3 CA246635, OT2OD026671, UH3 CA246594-01  |
| HuBMAP ID: | Authors leave blank; will be filled in at time of publication to the HRA portal. |
| Data Table: | This is filled in with the title of the OMAP and will contain links to the .csv and .xlsx files. Example: Organ Mapping Antibody Panel (OMAP) for Multiplexed Antibody-Based Imaging of Human Intestine with CODEX v1.0 CSV Excel |
| DOI Table: | This will contain the final DOI registered for the OMAP; authors should leave blank. |
| How to Cite This Data Table:  | Authors, name of OMAP, DOI. Example format: John Hickey. Organ Mapping Antibody Panel (OMAP) for Multiplexed Antibody-Based Imaging of Human Intestine with CODEX.<https://doi.org/10.48539/HBM373.HQCB.363> |
| How to Cite OMAP Tables Overall:  | Hickey, John W., Elizabeth K. Neumann, Andrea J. Radtke, Jeannie M. Camarillo, Rebecca T. Beuschel, Alexandre Albanese, Elizabeth McDonough, et al. 2021. “Spatial Mapping of Protein Composition and Tissue Organization: A Primer for Multiplexed Antibody-Based Imaging.” *Nature Methods*, November.<https://doi.org/10.1038/s41592-021-01316-y> |