Supplementary information for:

CELL ATLAS OF THE HUMAN FOVEA AND PERIPHERAL RETINA

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Figure S1
tSNE visualization showing contributions to cell types by batch for photoreceptors (a), horizontal cells (b), bipolar cells (c), amacrine cells (d), retinal ganglion cells (e) and non-neuronal cells (f). Each dot represents one cell. Colors distinguish retinas by donor and region (F-fovea, P-peripheral). Source of each sample is shown in Table S1. Because photoreceptors were depleted from peripheral samples, most were obtained from fovea (g). Expression of known photoreceptor type marker genes is plotted in h-l.

Figure S2
Violin and superimposed box plots showing expression of OPN4 in RGC clusters

Figure S3
Heat maps showing expression levels of disease genes by cell classes in the fovea and periphery. Only genes expressed by more than 20% of cells in any individual class in either fovea or peripheral cells are plotted.

Table S1
Information of donors from whom retinas were obtained.

Table S2
Publications on single cell or single nucleus RNA-seq analyses of human retina.

Table S3
Quality matrix of each collection.
Figure S1

- **Figures a-c** show TSNE visualization for different datasets: PR (a), HC (b), and BP (c), with color coding for H1P to H11F.
- **Figures d-f** display TSNE analysis for AC (d), RGC (e), and non-neuronal (f) categories.
- **Figures g-i** illustrate TSNE for PR (g), RHO (h), and NRL (i), highlighting fovea and peripheral regions.
- **Figures j-l** present TSNE representations for ARR3 (j), OPN1LW (k), and OPN1SW (l).
Table S1. Information of donors from whom retinas were obtained.

| Donor ID | Retina region(s) sampled | Donor Age | Donor sex | COD                                      | Duration to process after death (h) | 10X Kit version |
|----------|--------------------------|-----------|-----------|------------------------------------------|-------------------------------------|-----------------|
| H1       | Peripheral retina of left eye | 74        | Male      | Lung Cancer                              | 6                                   | V2              |
| H2       | Fovea retina of both eyes  | 78        | Male      | Metastatic Melanoma to brain             | 14                                  | V2              |
| H3       | Fovea and peripheral retina of right eye | 60 | Male | Left tonsillar squamous cell carcinoma metastatic to brain and left orbit | 6.5 | V2 |
| H4       | Fovea retina of left eye   | 64        | Male      | Diffuse B cell lymphoma spread to thorax and epigastrum | 5 | V2 |
| H5       | Fovea retina of left eye   | 69        | Male      | Metastatic Melanoma to brain, lung, spinal cord | 3 | V2 |
| H9       | Fovea retina of left eye   | 53        | Female    | Interstitial Lung Disease                | 5                                   | V2              |
| H11      | Fovea retina of right eye  | 65        | Male      | Metastatic Melanoma                      | 3                                   | V3              |
Table S2. Publications on single cell RNA-seq profile of human retina.

| Reference                           | Platform | Age      | #Donors | # cells | Separate fovea/macula and periphery | # clusters | Identify types within classes | Cells or nuclei |
|-------------------------------------|----------|----------|---------|---------|-------------------------------------|------------|-------------------------------|-----------------|
| Peng et al., 2019                   | 10X, V2  | Adult    | 1       | 2,383   | No                                  | 9          | Yes                           | cells           |
| Hu et al., 2019                     | Modified STRT | Fetal week 5-24 weeks | 19 embryos | 2,421   | No                                  | 21         | No                           | cells           |
| Lukowski et al., 2019               | 10X, V2  | Adult    | 3       | 20,009  | No                                  | 17         | Yes                           | cells           |
| Voigt et al., 2019                  | 10X, V3  | Adult    | 3       | 8,217   | Yes                                 | 17         | Yes                           | cryo-preserved cells |
| Menon et al., 2019                  | 10X, V3 and Seq-Well | Adult | 6 | 23,432 | Yes                                 | 9          | No                            | cells           |
| Liang et al., 2019                  | ICELL8   | Adult    | 3       | 5,873   | Yes                                 | 7          | No                            | nuclei          |
| Orozco et al., 2020                 | 10X,V2,V3 | Adult | 5 | 100,055 | Yes                                 | 46         | Yes                           | Nuclei          |
| Sridhar et al., 2020                | 10X,V1,V2,V3 | Fetal | 4 embryos | 61,164 | Yes                                 | 10         | No                            | Cells           |
| This study                          | 10X, V2 and V3 | Adult | 8 | 85,000 | Yes                                 | 58         | Yes                           | cells           |
Table S3. Sample quality matrix of each collection

| Library ID | total cells passed initial 600 gene filter | Final number of cells | median_nGene | median_nTrancripts | median_nMito | Amano_crine | Astrocytes | Bipolar | Cones | Endothelium | Horizontal | Microglia | Muller | RGC | Rods |
|------------|------------------------------------------|-----------------------|---------------|--------------------|--------------|-------------|------------|---------|-------|-------------|------------|----------|--------|------|-----|
| H1CD73dpS1 | 6614                                     | 5883                  | 1435          | 3085               | 10880        | 0.034       | 11.6       | 0.5     | 41.1  | 0.2         | 0.8        | 1.8      | 2      | 40.8 | 0.9 | 0.4 |
| H1CD90S1   | 7049                                     | 6181                  | 1523          | 3147               | 7634         | 0.052       | 51.3       | 0.9     | 7.1   | 0           | 0.1        | 0.2      | 0      | 31.9 | 8.5 | 0   |
| H2Fo-vea1S1| 2587                                     | 2191                  | 985           | 1730               | 4662         | 0.035       | 2.5        | 0       | 35.3  | 0.4         | 5.1        | 0.2      | 25.9   | 27.8 | 1.2 |     |
| H2Fo-vea2S1| 4597                                     | 4202                  | 960           | 1650.5             | 4526.5       | 0.035       | 1          | 0.1     | 31.0  | 0.4         | 4          | 0.8      | 40.8   | 20.6 | 0.4 |     |
| H3FoveaS1  | 3838                                     | 3015                  | 909           | 1749               | 7373         | 0.054       | 3.6        | 0.2     | 38.1  | 1.1         | 0.3        | 13.5     | 0.5    | 31.4 | 10.1 | 1.2 |
| H3FoveaS2  | 4717                                     | 3565                  | 934           | 1819               | 8498         | 0.054       | 3.2        | 0       | 41.9  | 1.2         | 0.3        | 14.2     | 0.4    | 27.5 | 9.2  | 2.1 |
| H3FoveaS3  | 34                                       | 25                    | 1394          | 2733               | 550895       | 0.036       | 12         | 0       | 52    | 0           | 0          | 12       | 0      | 20   | 4   | 0   |
| H3CD73dpS1 | 4447                                     | 3955                  | 1306          | 2772               | 17497        | 0.037       | 9.9        | 1.4     | 49.6  | 0.2         | 1.1        | 4.1      | 3      | 29.8 | 0.7  | 0.3 |
| H3CD73dpS2 | 4203                                     | 3750                  | 1270          | 2664               | 13471        | 0.037       | 10.6       | 1.3     | 47.9  | 0.2         | 1.2        | 3.6      | 2.8    | 31.3 | 0.8  | 0.4 |
| H3CD90S1   | 5385                                     | 4879                  | 1688          | 3480               | 13171        | 0.044       | 62.8       | 9.7     | 12    | 0           | 0.6        | 0.3      | 0      | 7.8  | 6.8  | 0   |
| H3CD90S2   | 5144                                     | 4674                  | 1642          | 3329.5             | 10239.5      | 0.043       | 63.8       | 9.3     | 12.3  | 0           | 0.8        | 0.3      | 0      | 7.4  | 6.2  | 0   |
| H4FoveaS1  | 5961                                     | 4388                  | 1306          | 2554               | 5635         | 0.059       | 11.8       | 0.2     | 27.5  | 0.9         | 0.5        | 5.2      | 0.4    | 33.7 | 11.7 | 8.1 |
| H5FoveaS1  | 7998                                     | 6856                  | 1342          | 2526               | 5212         | 0.041       | 5.9        | 0.2     | 29.8  | 4.4         | 0.3        | 2.8      | 0.4    | 22   | 26.3 | 7.9 |
| H5FoveaS2  | 6426                                     | 5603                  | 1323          | 2493               | 5151         | 0.042       | 6          | 0.3     | 30.5  | 0.3         | 2.8        | 0.4      | 21.1   | 24.1 | 9.4 |     |
| H5FoveaS3  | 6411                                     | 5550                  | 1293.5        | 2422               | 5044.5       | 0.043       | 5.3        | 0.2     | 31.4  | 0.3         | 3.1        | 0.5      | 19.9   | 25.1 | 9.4 |     |
| H5FoveaS4  | 6524                                     | 5661                  | 1313          | 2457               | 5223         | 0.042       | 6.2        | 0.2     | 30.6  | 0.8         | 0.4        | 3.2      | 0.3    | 20.7 | 24  | 9.6 |
| H5FoveaS5  | 6385                                     | 5511                  | 1331          | 2495               | 5768         | 0.042       | 5.4        | 0.2     | 31.5  | 0.3         | 3.2        | 0.4      | 22.2   | 21.7 | 10 |     |
| H6FoveaS1  | 7943                                     | 5480                  | 1220.5        | 2235.5             | 4399         | 0.053       | 2.5        | 0.2     | 27.4  | 6.3         | 0.5        | 1.3      | 1.3    | 25.5 | 3.3  | 31.8|
| H11FoveaS1 | 7798                                     | 4884                  | 1396          | 2863               | 4062         | 0.185       | 5.2        | 0.4     | 35.4  | 0.5         | 0.3        | 1.3      | 2      | 6.9  | 4.9  | 43  |