

Vignette Type: Scientific Knowledge

Specific Example: Whole Human Brain

User:

Career: Undergraduate Students | Graduate Students | Post-Docs | Senior Scientists/PI | Teachers

Experience of Cell Types: Novice | Advanced Beginner | Intermediate | Expert

Research: Basic | Translational

Research Type: Computational | Molecular | Behavior

Experimental Model: Mouse | Rat | Non-Human Primate | Human | Invertebrate | Non-Traditional Vertebrate

During journal club, a student was introduced to Siletti et al., 2023, which contains single nucleus RNA seq data from the entire human brain. Prior to journal club, the student had mainly read about cells in the neocortex; the student is now interested in learning more about data from other brain regions.

1. The student read in Siletti et al., 2023 that one of the more diverse areas was the brainstem. To isolate just nuclei from the brainstem, the student first clicks on the “Cell Properties” tab (step 1) and colors by “Anatomical Division” by clicking on the ink drop symbol (step 2). [Link to view in ABC Atlas](#)

The screenshot displays the ABC Atlas Brain Knowledge Platform interface. The top navigation bar includes 'ABC Atlas', 'Brain Knowledge Platform', and a 'SIGN IN' button. The left sidebar shows the 'Neurons' view with 'Human brain cell type diversity' and '2.48M cells'. The 'Cell Properties' tab is highlighted with a red box and a red arrow labeled '1'. Below it, the 'Anatomical Division' property is selected with a red arrow labeled '2'. The main panel shows a 3D brain model with various regions colored in different colors, representing different anatomical divisions.

2. To isolate nuclei from specific parts of the brainstem, the student clicks on the arrow (step 1) to display all anatomical divisions and checks the “Pons” box (step 2). [Link to view in ABC Atlas](#)

ABC Atlas ▾ Brain Knowledge Platform 🌙 ? 👤 SIGN IN

SELECTED VIEW

Neurons

Human brain cell type diversity

Cell Properties ⚙️

107k cells / 2.48M cells CLEAR 1 FILTER

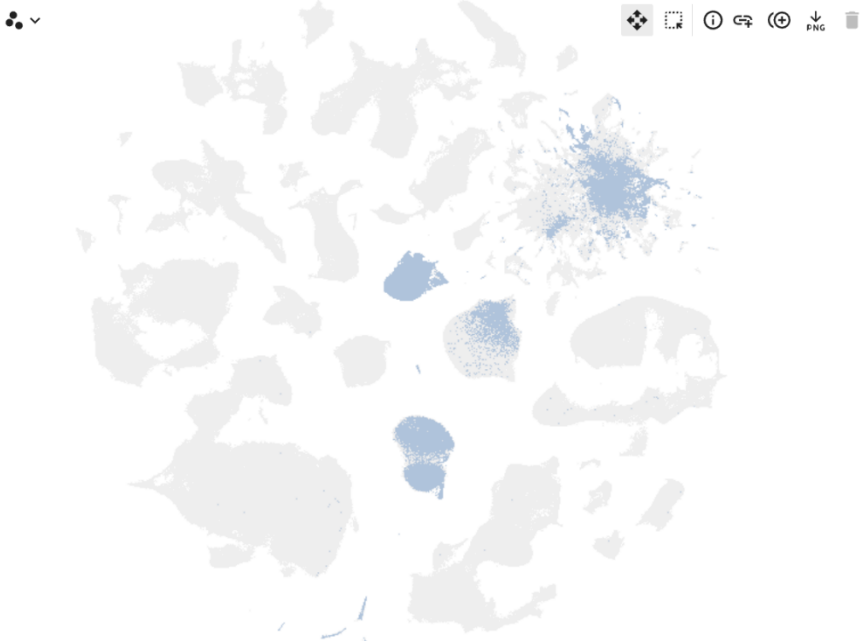
1 → ^ Anatomical Division 1 filter 🔍 🔇

<input type="checkbox"/>	Midbrain	0
<input type="checkbox"/>	Cerebellum	0
<input checked="" type="checkbox"/>	Pons	107k
<input type="checkbox"/>	Myelencephalon	0
<input type="checkbox"/>	Spinal cord	0

2 →

^ Supercluster 🔇

^ Subject ID 🔇



3. To look at the diversity within the pons, the student decides to look at the different clustered taxonomy levels (supercluster, cluster, and subcluster). The student filters by supercluster (the broadest level), by clicking the ink drop next to “Supercluster” (step 1) and selecting “Supercluster” in the pop-up menu (step 2). By clicking on the arrow next to “Supercluster” (step 3), the student can see the color-coded names of the superclusters present and the number of nuclei per cluster. [Link to view in ABC Atlas](#)

The screenshot displays the ABC Atlas Brain Knowledge Platform interface. The top navigation bar includes 'ABC Atlas', 'Brain Knowledge Platform', and a 'SIGN IN' button. The main content area is divided into a left sidebar and a right main view. The sidebar, titled 'Neurons' and 'Human brain cell type diversity', contains a 'Cell Properties' section with 107k cells / 2.48M cells. It lists several filters: Sex, Region of Interest, Anatomical Division (1 filter), Supercluster, Subject ID, and Neurotransmitter Type. A red arrow labeled '3' points to the 'Supercluster' filter. A dropdown menu is open for 'Supercluster', showing options: Color By, Supercluster (selected, with a red arrow labeled '2'), Cluster, and Subcluster. A red arrow labeled '1' points to the ink drop icon next to 'Supercluster'. The main view shows a brain map with various colored regions. Below the main view, a detailed list of superclusters is shown, with a red arrow labeled '3' pointing to the 'Supercluster' header. The list includes:

Supercluster	Count
> Splatter	33.1k
> Mammillary body	1
> Thalamic excitatory	0
> Midbrain-derived inhibitory	3.77k
> Upper rhombic lip	19k
> Cerebellar inhibitory	1.56k

4. To look at the next level, the student clicks the ink drop next to “Supercluster” (step 1) and selects “Cluster” in the pop-up menu (step 2). To view the clusters present within the superclusters, the student can see the color-coded names of the clusters by clicking on the arrow next to “Supercluster” (step 3) and then clicking the arrows next to the individual superclusters (step 4), to see the color-coded clusters within each supercluster. [Link to view in ABC Atlas](#)

ABC Atlas ▾ Brain Knowledge Platform

SELECTED VIEW

Neurons
Human brain cell type diversity

Cell Properties ⚙️ CLEAR 1 FILTER

107k cells / 2.48M cells

- Sex
- Region of Interest
- Anatomical Division 1 filter
- 3** → Supercluster → **1**
 - Color By
 - Supercluster
 - Cluster** → **2**
 - Subcluster
- Subject ID
- Neurotransmitter Type

3 → superclusters

^ Supercluster		+ - 🔍 📏
<input type="checkbox"/> >	Splatter	33.1k
<input type="checkbox"/> >	Mammillary body	1
<input type="checkbox"/> >	Thalamic excitatory	Superclust... 0
<input type="checkbox"/> >	Midbrain-derived inhi...	3.77k
<input type="checkbox"/> >	Upper rhombic lip	19k
<input type="checkbox"/> >	Cerebellar inhibitory	1.56k

4 → clusters

^ Supercluster		+ - 🔍 📏
<input type="checkbox"/> >	Midbrain-derived inhi...	3.77k
<input type="checkbox"/> >	Upper rhombic lip	19k
<input type="checkbox"/> >	URL_297	0
<input type="checkbox"/> >	URL_308	94
<input type="checkbox"/> >	URL_309	332
<input type="checkbox"/> >	URL_310	8.75k

- To look at the most detailed level of the taxonomy (subcluster), the student clicks the ink drop next to “Supercluster” (step 1) and selects “Subcluster” in the pop-up menu (step 2). To view the subclusters present within the clusters and superclusters, the student clicks on the arrow next to “Supercluster” (step 3), then clicks the on arrows next to the individual superclusters (step 4) to see the clusters within, and then clicks the on arrows next to the clusters to see the color-coded subclusters within each cluster (step 5). [Link to view in ABC Atlas](#)

Brain Knowledge Platform

ABC Atlas

SELECTED VIEW

Neurons
Human brain cell type diversity

Cell Properties ⚙️ CLEAR 1 FILTER

107k cells / 2.48M cells

- Sex
- Region of Interest
- Anatomical Division 1 filter
- 3** Supercluster ⌵ 1
- Subject ID
- Neurotransmitter Type

Color By

- Supercluster
- Cluster
- 2** Subcluster

3 **superclusters**

- Supercluster
- > Splatter 33.1k
- > Mammillary body 1
- > Thalamic excitatory 0
- > Midbrain-derived inhi... 3.77k
- > Upper rhombic lip 19k
- > Cerebellar inhibitory 1.56k

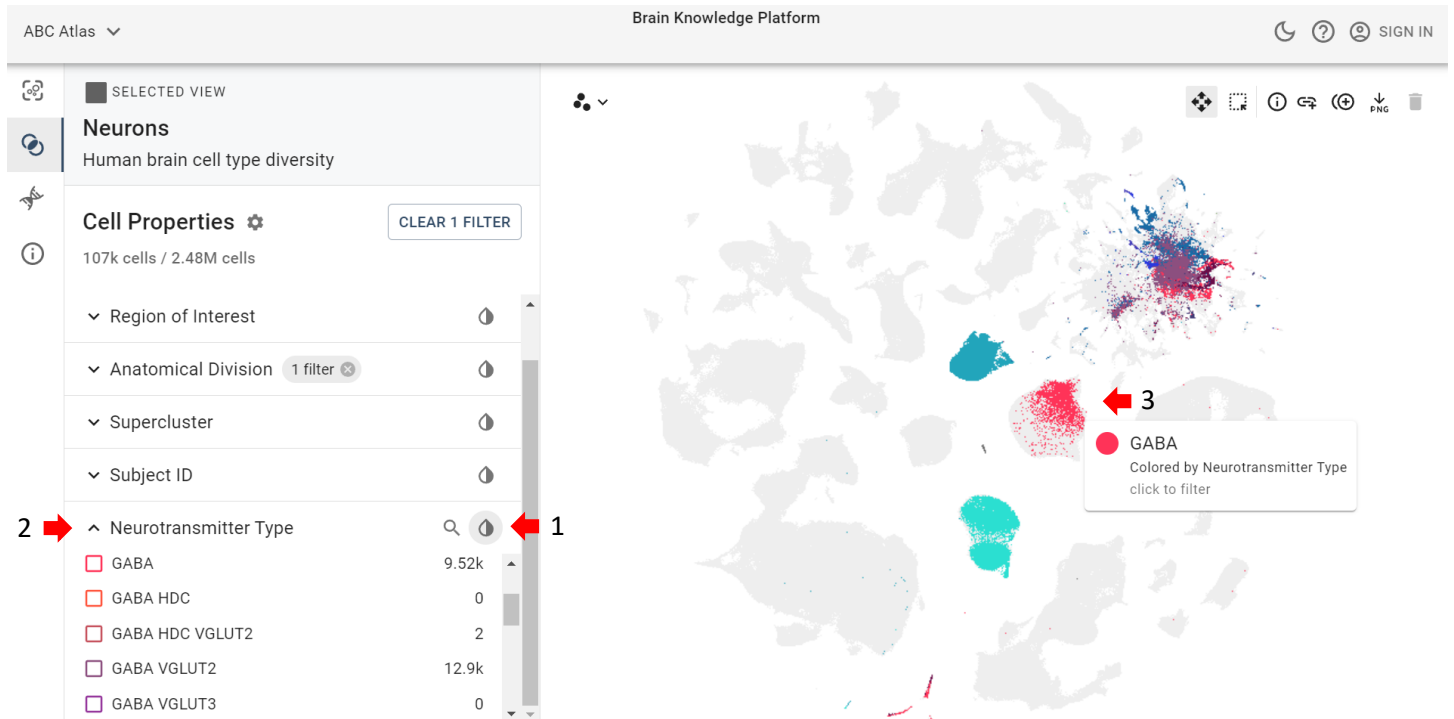
4 **clusters**

- Supercluster
- > Midbrain-derived inhi... 3.77k
- 4** > Upper rhombic lip 19k
 - > URL_297 0
 - > URL_308 94
 - > URL_309 332
 - > URL_310 8.75k

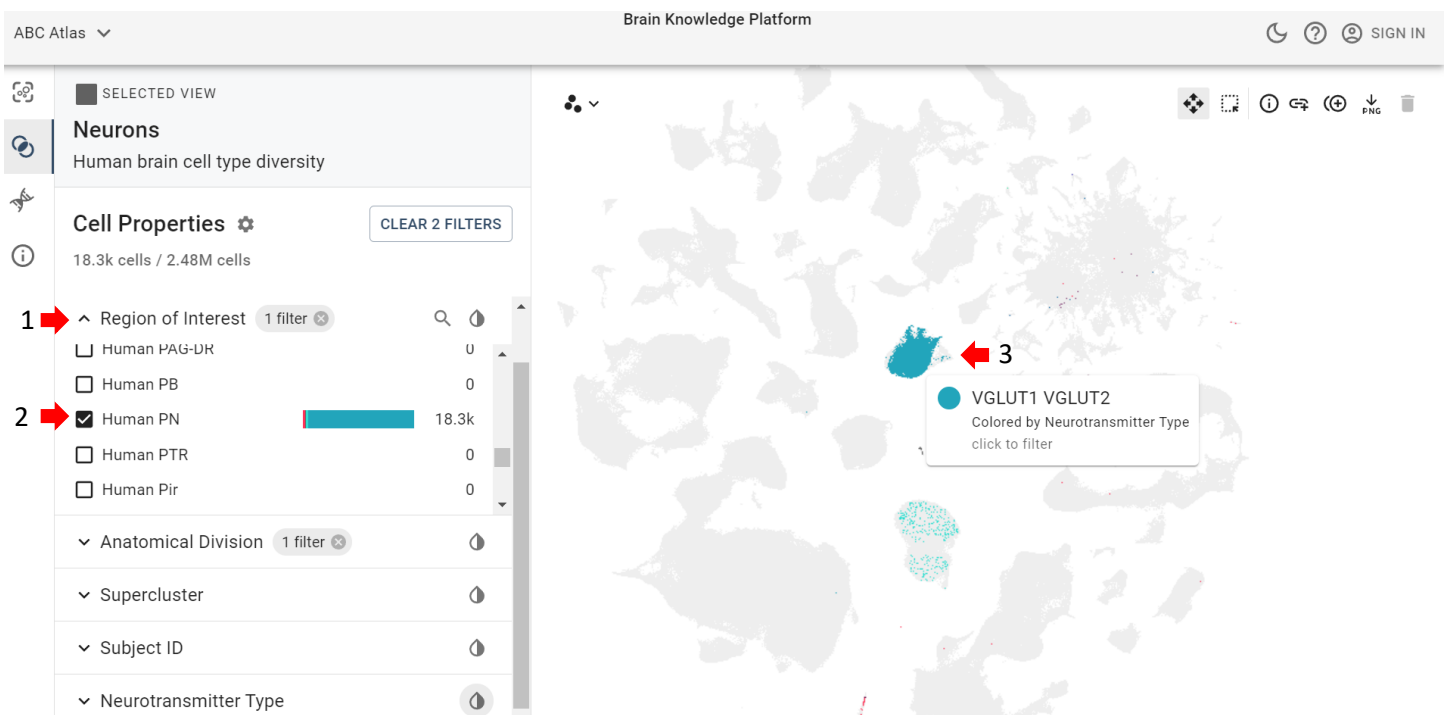
5 **subclusters**

- Supercluster
- > Upper rhombic lip 19k
 - > URL_297 0
 - 5** > URL_308 94
 - URL_308_1 17
 - URL_308_2 8
 - URL_308_3 44

6. To see which neurotransmitters are present in the pons, the student clicks on the ink drop symbol next to “Neurotransmitter Type” (step 1). Clicking the drop arrow next to “Neurotransmitter Type” shows all the color-coded neurotransmitter categories (step 2) and hovering a mouse over the colored t-SNE plot reveals the corresponding neurotransmitter group (step 3). [Link to view in ABC Atlas](#)



7. In Figure 1 of Siletti et al., 2023, the student read that the pons contained six regions of interest: DTg, PB, PN, PnAN, PnEN, and PnR. To see if neurotransmitters are region specific, the student clicks on the “Region of Interest” arrow (step 1), and filters for “Human PN” (step 2). By hovering the mouse over the colored part of the t-SNE (step 3), the student learns that the teal VGLUT1 VGLUT2 group is primarily in the PN region of the pons. [Link to view in ABC Atlas](#)



8. While reading Siletti et al., 2023, the student noticed that the genes for some calcium-binding proteins were expressed in the pons. To see if they were expressed in the “PN” region, the student clicks on the gene tab (step 1), and types in a gene from the paper, “PVALB” (step 2). The student then colors the plot for *PVALB* gene expression by clicking on the ink drop symbol (step 3) and sees that *PVALB* is highly expressed. [Link to view in ABC Atlas](#)

The screenshot displays the ABC Atlas Brain Knowledge Platform interface. The top navigation bar includes the logo 'ABC Atlas', the title 'Brain Knowledge Platform', and user options like 'SIGN IN'. The left sidebar shows a navigation menu with 'Neurons' selected and 'Genes' highlighted by a red box and a red arrow labeled '1'. Below 'Genes', there is a search bar with 'PVALB' entered, highlighted by a red arrow labeled '2'. The search results show 'PVALB' with a red arrow labeled '3' pointing to an ink drop icon. The main area on the right shows a brain map with a red and yellow spot in the pons region, indicating high expression of the PVALB gene.

9. Now that the student has learned a bit more about the pons, they are interested in looking at other brain regions as well; they then use the ABC Atlas to answer more questions.