Vps34 is a phosphatidylinositol 3-kinase, not a phosphoinositide 3-kinase
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There seems to be some confusion regarding the naming of enzymes that phosphor-
ylate certain lipids. In particular, we are 
referring to the lipid phosphatidylinositol and to phosphoinositides. Inositides are 
inositol-containing derivatives of phosphatidic acid (Fig. 1). The term phos-
phoinositide indicates that one or more of 
the hydroxyl groups of phosphatidylinositol is esterified with inorganic phosphate. 
Phosphatidylinositol is an inositide, but it is not a phosphoinositide, whereas phos-
phatidylinositol 3-phosphate (phosphatidylinositol that is phosphorylated on 
the three hydroxyl group of inositol) is a 
phosphoinositide (Fig. 1). In addition to 
phosphatidylinositol 3-phosphate, the lip-
ids phosphatidylinositol 3,4-bisphosphate, phosphatidylinositol 3,5-bisphosphate and 
phosphatidylinositol 3,4,5-trisphosphate are all phosphoinositides.

There is a single enzyme that converts 
phosphatidylinositol to phosphatidylinositol 3-phosphate, and that is Vps34. 
Furthermore, Vps34 only phosphorylates phosphatidylinositol, and does not act on 
other substrates. Thus, Vps34 is not a phosphoinositide kinase, but rather is 
a phosphatidylinositol kinase that phosphorylates the three hydroxyl group, 
making it in particular a phosphatidylinositol 3-kinase. In contrast, Vps34 is not a 
phosphoinositide 3-kinase, because its 
substrate, phosphatidylinositol, is not a 
phosphoinositide. At this point it might 
be worth considering, albeit briefly, the 
origin of these terms. That is, the end-
ing "-ide" refers to a chemical compound 
derived from or related to another such 
compound, or indicating one of a class 
of compounds. Thus, a phosphoinosit-
ide is related to phosphatidylinositol, and 
phosphatidylinositol 3-phosphate is one 
of a class of phosphoinositides. The suf-
fix "-ol" is used in the names of chemical 
derivatives representing alcohol (inositol is a 
sugar alcohol; Fig. 1).

When you see the abbreviation “PI3K” 
it is not clear whether the author is refer-
ing to a phosphoinositide 3-kinase or a 
phosphatidylinositol 3-kinase. In contrast, 
“PtdIns3K” makes it quite clear that the 
enzyme is acting upon phosphatidylinosi-
tol. Perhaps we are being obsessive, but 
when it comes to Vps34 we think people 
should refer to it as a phosphatidylinositol 
3-kinase because they are discussing the 
generation of phosphatidylinositol 3-phos-
phate or PtdIns(3)P, which is one of the 
lipids that we tend to be most concerned 
about with regard to macroautophagy. 
This is the reason that Autophagy uses 
the abbreviation “PtdIns3K” as the stan-
dard for the enzyme complex contain-
ing Vps34. Furthermore, you will not go 
wrong if you describe a phosphoinositide 
kinase such as Fab1 as a phosphatidylinosi-
tol 3-phosphate 5-kinase (PtdIns(3)

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P 5-kinase), for example, whereas you run the risk of incorrectly referring to an enzyme such as Vps34 as a phosphoinositide kinase.

There is one additional issue, and that concerns the distinction between the different classes of phosphatidylinositol kinases, and in particular the class I and class III enzymes. In this case, many people refer to the PI3KC3, which is a short and handy name, except when you consider that the official gene name in humans is “PIK3C3,” with the “3” and the “K” transposed, and both of these suffer from the problem of not making it clear whether we are really referring to a phosphatidylinositol 3-kinase or a phosphoinositide 3-kinase. Again, the class III enzyme that generates phosphatidylinositol 3-phosphate is not a phosphoinositide 3-kinase. In contrast, the enzyme that phosphorylates PtdIns(4,5)P_2 to PtdIns(3,4,5)P_3 can be correctly referred to as a phosphoinositide-3-kinase, but the substrate specificity is still not indicated. Therefore, Autophagy will use “PtdIns3KC3” to refer to the class III enzyme Vps34 when necessary, as this makes it clear that the substrate is phosphatidylinositol 3-phosphate.

We certainly hope this clears up any confusion.