

Correction to “Formation of Two Different Types of Oligomers in the Early Phase of pH-Induced Aggregation of the Alzheimer A β (12-28) Peptide”

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The attribution of the 1627 cm⁻¹ band in Figure 2a to a conformational change of the A β peptide is incorrect. We realized later that the positive 1627 cm⁻¹ band is associated with a negative band at 1410 cm⁻¹ which cannot be caused by the peptide. Further investigation concluded the following: the alkaline pH of the peptide samples made CO₂ dissolve and convert to carbonate. Upon lowering the pH in the first pH drop, carbonate converted to hydrogen carbonate, which caused a negative carbonate band at 1410 cm⁻¹ and a positive band at 1627 cm⁻¹ for hydrogen carbonate in our spectra. The infrared absorption of the carbonate/hydrogen carbonate system and its use for measuring the pH in infrared samples will be described in more detail in a forthcoming article (Baldassarre and Barth, *Analyst*, DOI: 10.1039/C3AN02331A). We conclude that the 1627 cm⁻¹ band is caused by the formation of hydrogen carbonate and not by the A β peptide.

In the second pH drop, we observed a different signal (near 1617 cm⁻¹), which slowly evolved and which we ascribed to a different type of A β aggregate. This interpretation is correct, but the 1617 cm⁻¹ aggregate is the only type of A β aggregate that we have observed. It comprises oligomers of different sizes, since the band shifts with time from originally 1622 to 1617 cm⁻¹, as described in the article. Nevertheless, the general architecture of these oligomers is similar—as judged from the similar infrared spectra—and therefore we count these oligomers as one type of aggregate. The information in the Supporting Information is correct.

Sonication prior to the experiments with the protected peptide abolished the 1627 cm⁻¹ band. We interpreted this as being due to the breakdown of existing peptide aggregates. However, we have now found that sonication seems to reduce the pH in peptide samples and converts carbonate to hydrogen carbonate. Therefore, after extra sonication, carbonate is no longer present prior to the first pH drop and the 1627 cm⁻¹ band is not formed. The sonication effect is not observed for NaOH solutions without peptide. There was also no effect of extra sonication on the 30% of unprotected peptide samples which gave the 1627 cm⁻¹ band upon the first and second flash. Likely, this is due to the pH in these samples being higher than that for the protected peptide samples.

The erroneous interpretation occurred because of the difficulty of pH measurements in the small sample volumes (μ L) used. The observation of carbonate protonation indicates that the initial pH in our samples was close to the pK of carbonate (11.0 in D₂O). At the time of publication of the original article, we had concluded from measurements with pH paper that the peptide solution had a lower pH: near a pH of 9. Therefore, one of our control samples—methylimidazole to mimic the histidines in the peptide—was prepared at a pH

(8.6) that was lower than the pH of the peptide samples and because of that did not show the 1627 cm⁻¹ band.

Detailed list of corrections:

- Title: “Two Different Types of” should be deleted.
- TOC/Abstract graphics: The middle panel should be deleted.
- Abstract: “two different types of” and the sentence starting with “One type has...” should be deleted.
- Page 12390, left column, last paragraph should read only as follows: “We observed formation of at least two different types of antiparallel β -sheets in the... more planar β -sheets developing relatively slowly from monomeric peptides.”
- Page 12391, first paragraph in section “Time-Resolved FTIR Spectroscopy of Protected A β (12-28)”. The second part of sentences 2 and 3 should be deleted and the assignment changed so that they read as follows: “Figure 2A shows the difference spectra. With the freshly prepared peptide (i.e., within 1 h), we found (Figure 2A) an intense broad positive band near 1627 cm⁻¹ after the first flash, which we assign to the formation of hydrogen carbonate.” In sentence 4, “A β (12-28)” should be deleted.
- Page 12392, left column, second paragraph: The first two sentences should be deleted.
- Page 12393, left column, third paragraph: Both occurrences of “ β -sheet” should be deleted.
- Figure 5: “Initial aggregates and” in the top left panel and the entire middle panel should be deleted. The second part of the legend should read as follows: “Top: samples with initial aggregates giving rise to 1627 cm⁻¹ aggregates in flash 1 and to 1617 cm⁻¹ aggregates in flash 2. Bottom: extra-sonicated samples without initial aggregates, giving the 1617 cm⁻¹ aggregates in both flashes.”
- Page 12394, column break. The sentence should be changed to the following: “Experiments with both protected and unprotected A β (12-28) indicated ~~two types of~~ β -sheet-containing oligomers characterized by different amide I absorption maxima at 1627 and 1617 cm⁻¹.” The following sentence should be deleted.
- Page 12394, right column. The section “Effects of End Protection” should read as follows: “For A β (12-28)_u and A β (12-28)_p, we found the same ~~two types of~~ aggregates as indicated by the same amide I maxima. ~~However, a striking difference was that the same aggregates were formed in consecutive flashes for A β (12-28)_u, whereas~~

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~~different aggregates formed for A β (12–28)p. This shows that charges at the peptide ends do not influence the structure, but the propensity for adopting a given structure. The latter effect could be explained by the presence of electrostatic attractive forces between the differently charged unprotected ends of this peptide when the strands are in an antiparallel orientation. We conclude that the protected and the unprotected A β (12–28) are capable of forming the same types of aggregates, indicating that the charges at the ends of the unprotected peptide have little effect on the structure of the oligomers. However, they affect the propensity to adopt a certain structure.”~~

- Pages 12394–12395: The section “1627 cm^{−1} Aggregates” should be deleted.
- Page 12395, right column: In the first paragraph, the sub clause starting with “since” should be deleted. In the fourth paragraph, two occurrences of “1727 cm^{−1} aggregates” should be replaced by “1627 cm^{−1} bands”.