of the world. Those groups designing PT/EQA challenges should consider providing similar rare samples where possible; from an educational standpoint, one option would be to provide gel images if the sample itself is not easily obtained. Given the spotlight on this case through both PT and the high impact article herein, it would be informative to determine whether there is improvement in identification of γ-HCD cases in future PT challenges.

Overall, this case study exemplifies an effective PT program. Starting with using a rare sample obtained from a commendably willing patient all the way to publication, this highlights a pathway to awareness for the laboratory community.

Author Contributions: *All authors confirmed they have contributed to the intellectual content of this paper and have met the following 4 requirements: (a) significant contributions to the conception and design, acquisition of data, or analysis and interpretation of data; (b) drafting or revising the article for intellectual content; (c) final approval of the published article; and (d) agreement to be accountable for all aspects of the article thus ensuring that questions related to the accuracy or integrity of any part of the article are appropriately investigated and resolved.*

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Commentary

David F. Keren*

This timely review provides an update on elegant new technologies that expedite characterization and measurement of γ heavy chains (γ-HC) while urging laboratorians to be on the lookout to prevent missing these rare, tell-tale, truncated molecules. Happily, final characterization of γ-HC is far more efficient with contemporary techniques than when one was required to perform immunoselection by embedding antisera against κ and λ chains in agarose to prove that the precipitation seen with anti-γ antisera was truly pure γ-HC *(1)*. Immunosubtraction, in the present case, nimbly documents the inability of antisera against free light chains to subtract the β-migrating γ-HC peak. The ability to visualize the area immunosubtracted by anti-γ reagent facilitates γ-HC measurement. Further, the exquisite specificity of Hevylite reagents provides another resource to reveal the presence of γ-HC by finding the sum of IgG_{κ} and IgG_{λ} divided by the IgG_{total} is lower than 0.8 *(2)*.

Initial detection of γ-HC by serum protein electrophoresis (SPE) is more challenging than its characterization these days because γ-HC may have a broad migration in the β region where transferrin and C3 provide camouflage. These issues may explain the sketchy detection of γ-HC by several laboratories in the National External Quality Assessment Service (NEQAS) data shared by the present report. It is not clear whether those laboratories used SPE alone, or whether they also used immunofixation electrophoresis (IFE). Even so, I have found cases with a broad, β-migrating γ-HC band precipitating with anti-γ, clearly lacking a corresponding band with either free light chain on IFE, that were overlooked by experienced laboratorians. Therefore, the other explanation for the NEQAS results is that unfamiliarity with γ-HC, reinforced by their absence in controls or in the many samples we see daily, is the gremlin that laboratorians need to overcome.

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