Roundtable Session 1 – Table 6 – Forgotten CE Technologies: CGE, ITP, Affinity CE, Taylor Dispersion

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Abstract:

CE is often only considered as CE-SDS in many parts of pharmaceutical R&D, however, there is a wealth of CE techniques available in the literature (CZE, ITP, Affinity CE, Frontal Analysis CE, Taylor Dispersion). This discussion is for identifying what other CE techniques are useful in the pharmaceutical industry and how as a community we can best advertise them as well as increase their accessibility.

Discussion Questions:

Do people have awareness about different types of CE? How many types of CE have you used?

Is there a lack of training in other CE techniques?

Are kits needed to make these less common techniques viable?

What applications could use these other CE types?

Notes:

Which techniques are not known – Which abbreviations are not known: ITP : Isotachophoreses, most difficult to understand, instead of having one medium in the whole capillary one has leading electrolyte and terminating electrolyte, constant current (→ same velocity, different mobilities), most use it as a concentration technology at the beginning of a ce

- Niche applications, Peak capacity / plate numbers very academic, in industry not primary goal, in industry you want to come to a good result

- Taylor dispersion: not Capillary electrophoresis but CE instrument used, band broadening measured, currently probably discontinued by nanoscale, maybe Danish company remaining
- What's the matrix in taylor dispersion . doesn't matter
- Used in Lupus-detection / sizes of particles / distribution, Light scattering: Dynamic size, Taylor is
- Light scattering over-interpretes big particles, Taylor dispersion has other biases

Can these techniques be used in industry? What are roadblocks

- Affinity CE: super useful – No courage to put to QC?
- Simple CZE is highly underrated, Gel is predictable but bad resolution, E.g. during nucleotide separation (couple of minutes), many proteins in a couple of minutes, problem often: we buy a kit, plug and play no thinking
- Main reason why forgotten: CGE and icIEF: Everything looks the same, which might be a good thing for QC, CZE not a commodity

Method development strategy:

- CGE and icIEF robust / QC ready
- Gel is very problematic too. – For Ebola vaccine and then Covid-Vaccine: CZE was able to be used, transfer to different sites – what went wrong? – diluted and undiluted were injected. Dilution step went wrong, CE did not go wrong

- Can HPLC be replaced by CE or vice versa?
- CE expert and HPLC expert will both get a solution
- For CE you need a higher level of understanding for HPLC it is easier.
- HPLCs are more user-friendly than CE, therefore lower hurdle
- Many more application notes, more suppliers, column material in HPLC
- Chiral separation easy in CE, hopeless in LC and GC at former times, at that time: if we need a chiral method: Priority is CE.
- Why doesn't Pharma take up quicker this great technology?

How is your experience, how is CE teached to you (in relation to HPLC),

- Often only platform method used, learning by troubleshooting
- A lot of people in management roles are focused on HPLC - This might be an issue of hierarchy, especially in the routine QC space
- Everyone wants something to be directly connected to a Mass Spec
- We need both, CE and HPLC, we need pressure on the vendor to come up with application notes
- Small molecules also very important: much more HPLC in that market
- Do we have numbers HPLC / CE – maybe factor 10
- 1990 a lot of CE was done in small molecule in the EU and Bio in the US
- Waters, Biorad, Applied Biosystem, Agilent many worse than own build, Agilent was best instrument, Agilent highly underestimated

Conclusion: Have more SMEs in place to use "forgotten" technologies, maybe also from CEPharm, a lot more has been done, than you know about,