

Is there an optimal pH for culture media used in clinical IVF?

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BACKGROUND: Reducing environmental stress imposed upon gametes and embryos in the IVF laboratory is crucial in optimizing culture conditions and development. One environmental parameter of particular importance is external pH (pHe) of culture media. An optimal pHe has not been identified.

METHODS: Electronic searches were performed using keywords focused on pH and the embryo using PUBMED through August 2011, with no limits placed on a beginning time. Examples of keywords include CO₂, bicarbonate and hydrogen ion. Relevant papers were then examined to obtain additional publications.

RESULTS: Determining optimal pHe is problematic due to difficulty in isolating pHe from other variables, such as CO₂ and bicarbonate. Various commercial media companies recommend differing pHe ranges, most within the range of 7.2–7.4, with some companies recommending altering pHe based on the gamete or stage of the embryo. However, changing pHe during culture has not been experimentally shown to improve outcomes. Further complicating attempts to define an optimal pHe is that media components can impact intracellular pH (pHi). As a result, media with different concentrations of substances, such as lactate or amino acids, may have different pHi, despite being in the same pHe.

CONCLUSIONS: Due to the plasticity of embryos, a range of pHe's can support development, and defining an optimal pHe is difficult. It is unclear whether there is any benefit in changing pHe at various steps during IVF. The ideal pHe will likely vary from media to media and, until comparative studies have been performed isolating pHe, adherence to manufacturer recommendations and maintenance of a small acceptable pHe range are advisable.

Key words: pH / carbon dioxide / sodium bicarbonate / embryo culture / blastocyst