

Difference Between DMEM and EMEM

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Key Difference - DMEM vs EMEM

Animal [cell culturing](#) is performed to maintain animal cell lines in order to conduct many research activities. Animal cell lines are maintained under [sterile](#) conditions, and they require special techniques. They are used in studies regarding vaccine production, to identify the behaviour of the cell to carcinogens and mutagens and in cancer research. The cell culture media are very important for the success of animal cell culture. There are different types of cell culture media such as Dulbecco's Modified Eagle Medium (DMEM) and Eagle's Minimum Essential Medium (EMEM). DMEM is a modified basal medium with increased amino acid and vitamin concentrations up to a fourfold. This also includes some more substitutions that increase the nutrient conditions of the media. EMEM is one of the first types of animal cell culture media developed by Harry Eagle. It is a simple, basal media with the minimum amounts of nutrient compositions. The **key difference** between two media is the nutrient composition. **EMEM is composed of the minimum concentrations of nutrients required for the growth of the culture, whereas DMEM is a much complex media with increased concentrations of amino acids and vitamins.**

What is DMEM?

Dulbecco's Modified Eagle's Medium (DMEM) is a modified media type that is commercially prepared as a creamish white powder. This is adapted from EMEM, and the nutrient composition is modified by increasing the concentration of amino acids and vitamins. The concentration of amino acids is increased up to two-fold in comparison to the basal medium. The vitamin concentration is increased up to fourfold thereby increasing the nutrient content in the medium.

DMEM is also modified by adding more salts such as ferric nitrate, sodium pyruvate and some non - essential amino acids such as serine and glycine. The concentration of [glucose](#) in the media is also altered. The original formulation is composed of 1000 mg/L of glucose, whereas in DMEM, the concentration is increased up to 4500 mg/L. DMEM also requires supplementation of a [serum](#) medium as it is not a complete medium. Most often, DMEM is supplemented with Fetal Bovine Serum (FBS). FBS provides the required proteins and growth factors for the culturing process.

The pH of the medium varies upon addition of [Sodium Bicarbonate](#). pH of the medium before adding Sodium Bicarbonate is around 6.80 – 7.40, whereas the pH, after adding Sodium Bicarbonate lies in the range of 7.60 – 8.20. The storage temperature of the media is 2 - 8 °C.

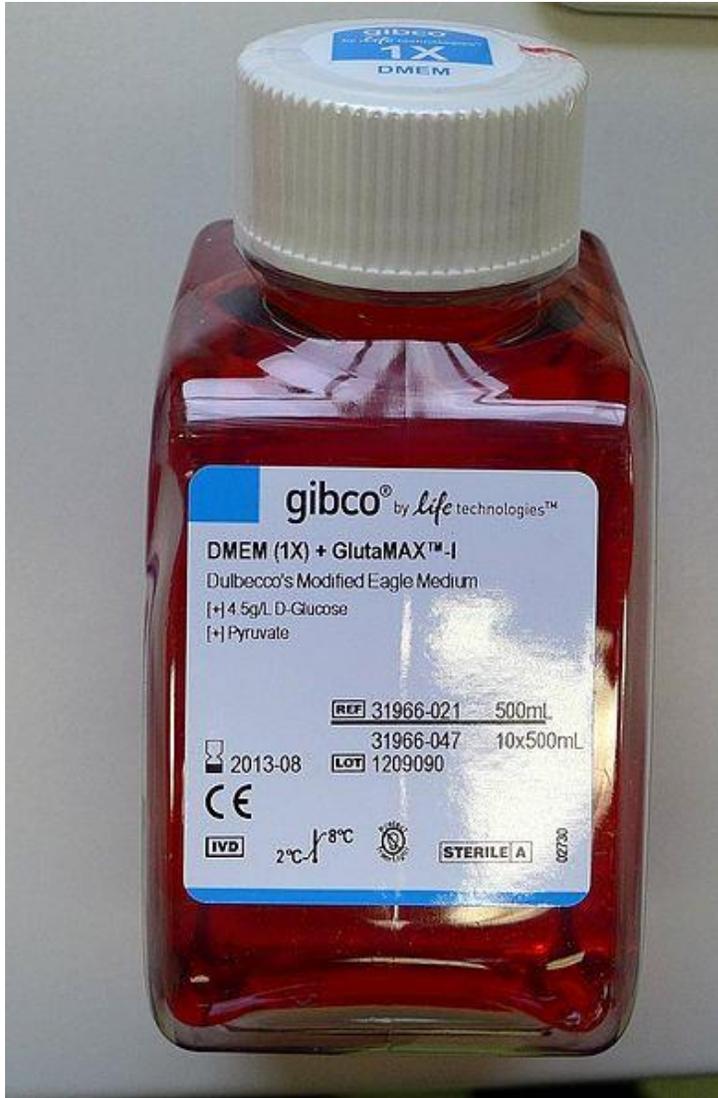


Figure 01: DMEM

Applications of DMEM are:

- To study the plaque-forming ability of the polyomavirus in mouse embryonic cells.
- In contact inhibition studies
- In chicken cell cultures

What is EMEM?

Eagle's Minimum Essential Medium (EMEM) is one of the first developed media in cell culturing of animal cell lines. The first types of animal cell lines grown using EMEM include Mouse L cells and HeLa cells. The EMEM media is also a type of modified media. Harry Eagle first formulated the EMEM medium. EMEM media included the essential amino acids and vitamins in a minimum concentration required by the cell types. The non –

essential amino acids were not included in the formulation, and the glucose and sodium bicarbonate concentrations are reduced. Although the media contained the balanced amount of minimum growth requirements for the successful growth of the cells.

EMEM is not a complete medium. Therefore, supplementation with serum is required for the successful growth of the mammalian cells. EMEM is used on a wide variety of cells and is still a popular media among cell culture researchers.

What are the Similarities Between DMEM and EMEM?

- Both media types are used in animal cell culture.
- Both media types are liquid formulations.
- Both media types are modified media from the basal media.
- Both media types contain the essential amino acids, vitamins and inorganic salts that are required for growth.
- Both media types are incomplete. Therefore, serum should be added.
- Both media types use glucose as its carbon source.
- Both media types have a higher pH and are adjusted by adding sodium bicarbonate.

What is the Difference Between DMEM and EMEM?

DMEM vs EMEM	
DMEM is a modified type of basal medium, with increased amino acid and vitamin concentrations. This also includes some more substitutions which increase the nutrient conditions of the media.	EMEM is one of the first types of animal cell culture media developed by Harry Eagle. It is a simple, basal media with the minimum amounts of nutrient compositions.
Modifications of Amino Acid	
Amino acid concentration has increased up to twofold in DMEM medium.	Minimal concentration of amino acid is used in EMEM.
Modifications of Vitamins	
Vitamin concentration has increased up to fourfold in DMEM.	Minimal concentration of vitamins is used in EMEM.
Glucose Concentration	
Glucose concentration has increased up to 4500 mg/L in DMEM.	Glucose concentration is 1000 mg/L in EMEM.
Presence of Non-Essential Amino Acids	

Present in DMEM.	Absent in EMEM.
Presence of Additional Components	
Components like ferric nitrate, sodium pyruvate are present in DMEM.	EMEM contains the minimal amount of nutrients.

Summary - DMEM vs EMEM

DMEM and EMEM are two popular animal cell culture media that mainly differ in their nutrient compositions. DMEM is modified form of EMEM, where the nutrient concentrations are increased along with the addition of some new components. EMEM is a minimal media and contains all the essential factors required for the successful growth of the animal cell lines. These media should be used under high sterile conditions, and both media should be supplemented with the serum before use. This is the difference between DMEM and EMEM.

Reference:

- 1.Arora, Meenakshi. "Cell Culture Media: A Review." Materials and Methods, 25 Nov. 2017. [Available here](#)
- 2."Eagle's minimal essential medium." Wikipedia, Wikimedia Foundation, 24 Dec. 2017. [Available here](#)

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