REGENERATIVE MEDICINE AND VETERINARY SCIENCE

INTRODUCTION
Regenerative medicine refers to therapies that seek to restore the form and function of normal cells using the body's own biological machinery, as are stem cells. Since the first study succeeded in achieving pluripotent stem cells in 1981, the aim of the research has been changing diversely, from preclinical model in experimental studies for human diseases to clinical therapeutic applications in animals.

WHAT ARE STEM CELLS?
Stem cells are functionally defined as cells with:
• Capacity to self-renewal
• Ability to generate differentiated cells
Maintained indefinitely in culture and still maintain the competence to produce cells in a foetus.

AIM OF THE STUDY
• Discover the basics of regenerative therapies.
• Better understand stem cells and its types.
• Observe the progress made in therapeutic applications in veterinary medicine so far.

Classification
According to their ability to differentiate:
• Pluripotent: embryonic stem cells (ESCs) and induced pluripotent cells (iPSCs).
  - give rise to all the tissues of the body.
• Multipotent: mesenchymal adult somatic cells (ASCs).
  - replenish cells within specific organs or tissues.

The stage of development where they are obtained:
• Embryonic stem cells
  - inner cell mass of the blastocyst.
• Adult somatic stem cells
  - tissue lineages.
  - Mainly from bone marrow and adipose tissue.

STEM CELL APPLICATIONS

COMPARISON BETWEEN STEM CELL TYPES

<table>
<thead>
<tr>
<th>ESCs</th>
<th>ASCs</th>
<th>iPSCs</th>
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<tbody>
<tr>
<td>Derived from the inner cell mass of the blastocyst</td>
<td>Come mainly from bone marrow or adipose tissue</td>
<td>Come from reprogramming of somatic cells</td>
</tr>
<tr>
<td>Pluripotent</td>
<td>Multipotent</td>
<td>Pluripotent</td>
</tr>
<tr>
<td>Allogenic</td>
<td>Autologous</td>
<td>Autologous</td>
</tr>
<tr>
<td>No clinical applications</td>
<td>There are clinical applications (main source of actual therapies)</td>
<td>Still clinical applications in study</td>
</tr>
<tr>
<td>Risk of teratomas and teratocarcinoma</td>
<td>Slight tumorigenic risk</td>
<td>Risk of teratomas</td>
</tr>
</tbody>
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CONCLUSIONS
• Advances in studies in veterinary medicine have opened a wide range of opportunities for regenerative medicine therapies.
  - However the studies do not follow the standards or protocols.
  - Its reliability is questionable and may jeopardize the reputation of the field.
• Most applications today are for musculoskeletal diseases, but gradually new doors are being opened for other diseases.
  - Cardiac or hepatic disorders, diabetes, transplants.
• When regenerative medicine is well-defined it will give tools for new therapeutic approaches and to improve the research in human medicine.