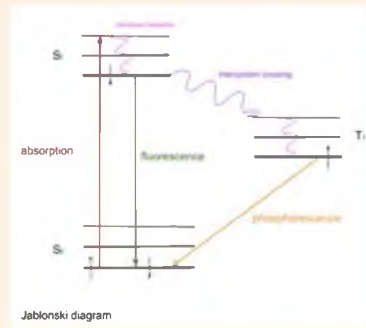


FLUORESCENCE-GUIDED SURGERY (FGS) USING 5-AMINOLEVULINIC ACID (5-ALA) OF MALIGNANT GLIOMAS

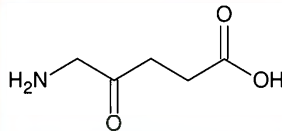
WIKTORIA MYTYCH, ENGLISH DIVISION SCIENCE CLUB, UR.
TUTOR : DR. HAB. N. MED. DAVID AEBISHER, PROF. UR.

MECHANISM OF FLUORESCENCE

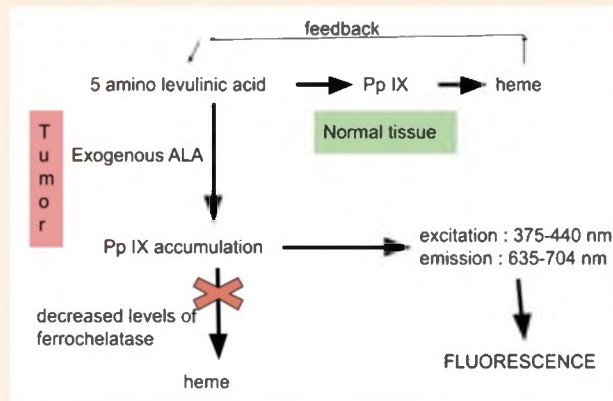
PHOTOLUMINESCENCE, OR FLUORESCENCE, IS A TYPE OF LUMINESCENCE, I.E. A PHENOMENON RELATED TO THE ILLUMINATION OF VARIOUS SUBSTANCES. IN THE HUMAN BODY, BIOMOLECULES PRACTICALLY DO NOT FLUORESCENCE. FLUORESCENCE ABSORBS ENERGY THAT THE BODY CAN DEVOTE TO CHEMICALLY USEFUL ENERGY. THE ABSORPTION OF RADIATION GOING INTO EXCITED STATES CAN BE VERY RAPID. THE EMITTED PHOTON MAY LENGTHEN AND THE MOLECULE WILL BEGIN TO UNDERGO NEGATIVE PHOTOCHEMICAL PROCESSES. PHOTODISSOCIATION CAN LEAD TO IRREVERSIBLE CHANGES IN THE DNA MOLECULE AND, CONSEQUENTLY, LEAD TO CELL DEATH. HOWEVER, IN MEDICINE, FLUORESCENT DYES ARE USED TO MARK SPECIFIC TISSUES, CELLS AND MOLECULES. IT DOES THIS BY BINDING TO THEM IN CELLS. A GIVEN PHOTOSENSITIZER IS CAREFULLY SELECTED FOR THE PLACE WHERE IT IS TO ACCUMULATE. AS A RESULT, THE SELECTIVITY OF THE METHOD IS POSSIBLE AND THE HEALTHY TISSUE IS NOT DAMAGED.



5-ALA IS A NATURAL METABOLITE IN THE HUMAN BODY THAT IS PRODUCED WITH THE HEMOGLOBIN METABOLIC PATHWAY.



EXOGENOUS 5-ALA IS ORALLY ADMINISTERED AND HAS UNPRECEDENTED PENETRATION OF THE BLOOD BRAIN BARRIER AND TUMOR INTERFACE IN BRAIN TUMORS



THE ACCURACY OF 5-ALA-INDUCED TISSUE FLUORESCENCE IN MALIGNANT GLIOMAS IS A KEY ADVANTAGE OF FGS WITH 5-ALA. THIS METHOD ALLOWS INTRAOPERATIVE VISUALIZATION OF MALIGNANT GLIOMA TISSUE MARGINS IN REAL TIME, ENABLING MAXIMUM RESECTION AND ENSURING THE SAFETY OF SURROUNDING TISSUES. BY USING 5-ALA FGS, SURGEONS CAN ACHIEVE A SIGNIFICANTLY HIGHER PERCENTAGE OF COMPLETE RESECTIONS OF MALIGNANT GLIOMAS COMPARED TO CONVENTIONAL RESECTIONS. THIS HAS LED TO THE FACT THAT IN COMPOUND 5-ALA FGS HAS BECOME AN ESSENTIAL SURGICAL TECHNIQUE AND STANDARD OF CARE IN MANY NEUROSURGICAL DEPARTMENTS AROUND THE WORLD.