Background: for amandas honours proposal it came to 2,450words.

Caveolae, Caveolin and Cavins; Basic molecular biology intro:

Caveolae, flask-like invaginations of the plasma membrane, exosome and microvesicle biogenesis and regulation have been linked to Caveolin family activity and expression. These vesicles allow for intercellular transport of proteins, Ribonucleic acids (RNA) and lipids which previously been attributed to a range of biological processes. Hereby, finding that disrupting this regulation has been attributed to multiple diseases is not unexpected. Namely, prostate cancer (PC) cells exemplify the range of negative effects that occurs when Caveolins are abnormally expressed. These Caveolins, particularly caveolin-1 (CAV1), facilitate vesicle formation by associating with cholesterol-enriched membrane microdomains on the plasma membrane. However, in the case of prostate cells where no Caveolin is usually expressed, CAV1 is upregulated to stimulate cancer-like properties, due to stimulating signalling processes attributed to tumour progression, invasion and metastasis. In contrast, typical function of CAV1 requires the introduction of coat proteins called Cavins (named 1-4) that stabilise Caveolae.

Exosomes and microvesicles:

Long range intercellular communication takes advantage of membrane bound vesicles, exosomes and microvesicles, secreted from a cell to allow for cell-specific homing of cargo and enhanced stability in interstitial fluid. These extracellular vesicles, which only differ by route of release, require cholesterol, sphingolipid and ceramide rich lipid microdomains to recruit a two main families of proteins to mediate release. Once released, the cytoplasmic contents, which also contains selectively exported ribonucleic acids (RNA), proteins and lipids, can be reabsorbed by other cells to facilitate biological function.

You’re floundering into other sections. Start again.

Significance and broad field: 100w

Prostate cancer intro and significance, lack of understanding of cargo loading/ vesicle as therapy.

Exosomes and microvesicles: 200w

Exosomes are defined as 40-100nm diameter extracellular vesicles formed by exocytosis of multivesicular bodies. Whilst similar in size and biochemical markers, microvesicles differ from exosomes by being released directly from budding of the plasma membrane. Despite being two different vesicle subtypes, their similarities make these difficult to distinguish experimentally. These vesicles contain cytoplasmic material with selectively exported ribonucleic acids (RNA), proteins and lipids due loading mechanisms with integral surface proteins. As such, this secretion facilitates long range intercellular communication, benefiting from homing mechanisms by surface proteins and enhanced stability of the contents due to being membrane bound. The membrane composition, being lipid raft like and cholesterol rich, recruits the caveolin family proteins to mediate its formation. Additionally, cytoplasmic coat proteins, from the Cavin family, regulate the caveolin interaction.

Caveolin: 120w

Caveolin in Cancer: 100w

Cavins: 100w

Cavins role in exosomes/caveolae: 200w

Cavins for cancer therapy: 100w

microRNAs in Cancer: 200w

miRNAs in prostate cancer/exosomes: 100w

Cavins and miRNAs: 200w

INCLUDE CRITICAL REVIEW OF RELAVNT LITERATURE (60% of the report so ~2400words)