infiltration and t e protective systems put in place by nerve cells as well as t e environment of t e nervous system.

utations rarely occur in nerve cells due to t eir inability to proliferate and regenerate from t eir senescent state in. utations are rare in t e small pool of neuronal progenitor and precursor cells w ic are c aracterised wit desirable regenerative and differentiation abilities due to t eir increased expression of DNA damage detector c ec point proteins p and N. utated nerve cells are mar ed for DNA damage repair or apoptosis w ere potential oncogenic mutations are not passed onto daug ter cells and are removed from t e genome. umorous growt s w ic bypass t ese protective mec anisms are t en detected by t e abundancy of immune cells surveilling t e nervous system and wit in t e lymp atic system w ic mar t em for degradation. etastasis of nerve cell tumours is reduced by t e ard bony structures and presence of t e . inally, mutations w ic develop oncogenic transformation of cells are predominantly somatic w ere germline mutations account for a small proportion of nerve cell tumours. Additional ris factors ave been mentioned suc as ionising radiation and increasing prevalence due to increasing age and early c ild ood.

owever, it is important to consider t e disadvantageous impact of t ese protective mec anisms in t e nervous system. e limited number of CNS and NS regenerating cells cause significant problems ot er t an avoiding cancer. ollowing injury to t e spinal cord, brain and perip eral nerves t ey are unable to e uivalently regenerate to previous levels. e uestion remains w et er t e decreased number of nerve cell tumours is more beneficial over t e vast number of degenerative nervous system diseases w ic stem from t e inability of nerve cells to proliferate and regenerate.

Additionally, due to t ese cancers being so rare in nature it as resulted in less available researc in t erapeutic treatment compared to more common breast cancer. t also becomes a c allenge for clinicians as t e symptoms presented for nervous system tumours s are similarities for stro es.

erefore, t ese types of neoplasms could be missed in diagnostics due to t e lac of researc into t ese types of tumours and t eir understandings. is contributes to t e issue of cancer registries listing incidence and mortality rates of neural tumours w ic are unrepresentative. ess developed countries correlate wit decreased rates of nerve cell tumours due to t e limited availability of ealt care w ere cases go undiagnosed. mprovements are re uired in reporting t ese cases to provide representative data to conclude ris factors based on gender, et nicities, geograp ic location and age.

imitations

As wit every literature review, t e associated limitations must be addressed. esearc conducted into t e mec anisms and adaptations underlying t e rarity of nerve cell tumours is considerably limited w ic presented difficulties in researc ing and selecting relevant journals in line wit t e aims establis ed in t is review. Searc terms were narrowed as muc as possible to increase relevancy yet, some literature may ave been missed w ic mig t ave provided insig ts into areas not discussed ere despite using four searc engines to conduct t e review. Additionally, as t ere are multiple different types of cells associated wit t e nervous systems, numerous different types of tumours are a result.

is created a limitation as nerve cell tumours couldn t be establis ed by t eir specific rarity as t ere are too many to cover in t is rapid review. any of t e literature surrounding tumours, nerve cells and CNS and NS are review papers. t was a c allenge to find original researc papers rat er t an literature reviews on t is topic. ere is possible bias in t is review tailored towards t e CNS compared to NS. is is due to t e increased number of publications surrounding t e CNS w ereas tumours of t e NS are relatively under-researc ed creating a c allenge to find relevant literature. inally, classifications of CNS s ave c anged over time according to t e . is as led to a uge number of older publications using incorrect terminology to describe t ese tumours w ic associated confusion.

uture Directions

Despite establis ing important conclusions underlying t e rarity of nerve cell tumours, many uestions remain unanswered w ic would provide essential insig t into specific tumour rarity by generating new aims. articularly understanding t e mutations involved wit nerve cell tumours and t erefore, potential t erapeutic targeting treatment into improving t e ig morbidity rate associated wit t ese tumours.

Areas for furt er exploration include t e triggering factors stimulating DNA repair in post-mitotic neurones w ic ave re-entered t e cell-cycle. is would provide insig t into t e ways in w ic neurones can maintain t eir population wit out inducing apoptosis following DNA damage as radiation and pollutants will continue increasing leading to eig tened oncogenic mutations. Additionally, researc into NSCs and N Cs in t eir utilisation of t erapeutic potential against malignancies is re uired as t ese cells are targeted and ijac ed by tumours (particularly gliomas) due to t eir proliferating and regenerating capacities. Development of targeted immunot erapy as been s own to be a promising avenue of treatment in more common cancers e.g. breast t erefore, researc into biomar ers and immune profiling of nerve cell tumours would provide improvements in treatment following diagnosis.

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