PROVA NON ESTRATTA PERON CAMILLE 17-11-21

01_Concorso Pubblico, per titoli ed esami, per la copertura a tempo determinato, della durata di cinque anni per n. 4 posti di RICERCATORE SANITARIO, cat. D, livello D super da assegnare a: UOC SERVIZIO DI MEDICINA DI LABORATORIO – GENETICA MEDICA E NEUROGENETICA, UOC NEUROLOGIA 3 - NEUROALGOLOGIA, UOC NEUROLOGIA 4 – NEUROIMMUNOLOGIA E DELLE MALATTIE NEUROMUSCOLARI, UOC NEUROLOGIA 5 – NEUROPATOLOGIA

PROVA 1

Biologia molecolare/cellulare/genomica

Con il termine "organismo modello" si definisce un qualsiasi sistema procariotico o eucariotico con caratteristiche tali da poter essere usato in laboratorio ai fini di ricerca. Il candidato/La candidata descriva la sua esperienza diretta e/o le sue conoscenze teoriche sull'argomento.

Informatica

La seguente formula Excel "=SOMMA(B1:B10)"
a. calcola la somma di tutti i valori contenuti nelle celle da B1 a B10 estremi inclusi
b. calcola la media dei valori contenuti da B1 a B10
c. calcola la somma del contenuto della cella B1 con il contenuto della cella B10

Prova Inglese

The NGS technology for the identification of genes associated with the ALS. A systematic review

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Abstract

Background: More than 30 causative genes have been identified in familial and sporadic amyotrophic lateral sclerosis (ALS). The next-generation sequencing (NGS) is a powerful and groundbreaking tool to identify disease-associated variants. Despite documented advantages of NGS, its diagnostic reliability needs to be addressed in order to use this technology for specific routine diagnosis.

Material and Methods: Literature database was explored to identify studies comparing NGS and Sanger sequencing for the detection of variants causing ALS. We collected data about patients' characteristics, disease type and duration, NGS and Sanger properties.

Results: More than 200 bibliographic references were identified, of which only 14 studies matching our inclusion criteria. Only 2 out of 14 studies compared results of NGS analysis with the Sanger sequencing. Twelve studies screened causative genes associated to ALS using NGS technologies and confirmed the identified variants with Sanger sequencing. Overall, data about more 2,000 patients were analysed. The number of genes that were investigated in each study ranged from 1 to 32, the most frequent being *FUS*, *OPTN*, *SETX* and *VCP*. NGS identified already known mutations in 21 genes, and new or rare variants in 27 genes.

Conclusions: NGS seems to be a promising tool for the diagnosis of ALS in routine clinical practice. Its advantages are represented by an increased speed and a lowest sequencing cost, but patients' counselling could be problematic due to the discovery of frequent variants of unknown significance.

KEYWORDS

amyothrophic lateral sclerosis, evidence, gene detection, next-generation sequencing, systematic review

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PROVA 2

Biologia molecolare/cellulare/genomica

Il candidato/La candidata descriva quali strategie conosce per dimostrare la patogenicità di una variante genica sconosciuta identificata in un individuo affetto da una malattia.

Informatica

Per URL si intende: una sequenza di caratteri che

a. identifica univocamente l'indirizzo di una risorsa web
b. un componente del sistema operativo
c. un linguaggio di programmazione

Prova Inglese

Nerve biopsy: Current indications and decision tools

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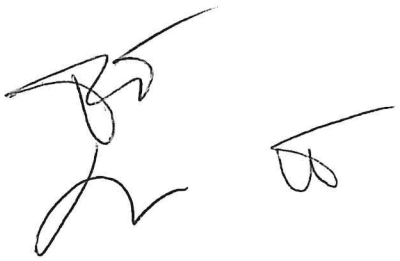
Abstract

After initial investigation of patients presenting with symptoms suggestive of neuropathy, a clinical decision is made for a minority of patients to undergo further assessment with nerve biopsy. Many nerve biopsies do not demonstrate a definitive pathological diagnosis and there is considerable cost and morbidity associated with the procedure. This highlights the need for appropriate selection of patients, nerves and neuropathology techniques. Additionally, concomitant muscle and skin biopsies may improve the diagnostic yield in some cases. Several advances have been made in diagnostics in recent years, particularly in genomics. The indications for nerve biopsy have consequently changed over time. This review explores the current indications for nerve biopsies and some of the issues surrounding its use. Also included are comments on alternative diagnostic modalities that may help to supplant or reduce the use of nerve biopsy as a diagnostic test. These primarily include extraneural biopsy and neuroimaging techniques such as magnetic resonance neurography and nerve ultrasound. Finally, we propose an algorithm to assist in deciding when to perform nerve biopsies.

KEYWORDS
decision aid, indications for biopsy, nerve biopsy, neuropathology, vasculitic neuropathy



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PROVA 3

Biologia molecolare/cellulare/genomica

Il candidato/La candidata descriva brevemente la differenza tra approcci di sequenziamento del DNA tramite tecnica di Sanger e tramite approcci di next generation sequencing (tecniche NGS).

Informatica

Il termine "Open Source" indica:

a. un software i cui autori ne permettono e favoriscono il libero studio e l'apporto di modifiche da parte di altri programmatori

b. un software che può essere modificato da chiunque a patto di corrispondere all'autore una offerta libera

c. un software protetto da diritti d'autore che non può essere modificato da nessuno tranne da chi ne detiene i diritti

Prova Inglese

Induction of Pluripotent Stem Cells from Mouse Embryonic and Adult Fibroblast Cultures by Defined Factors

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SUMMARY

Differentiated cells can be reprogrammed to an embryonic-like state by transfer of nuclear contents into oocytes or by fusion with embryonic stem (ES) cells. Little is known about factors that induce this reprogramming. Here, we demonstrate induction of pluripotent stem cells from mouse embryonic or adult fibroblasts by introducing four factors, Oct3/4, Sox2, c-Myc, and Klf4, under ES cell culture conditions. Unexpectedly, Nanog was dispensable. These cells, which we designated iPS (induced pluripotent stem) cells, exhibit the morphology and growth properties of ES cells and express ES cell marker genes. Subcutaneous transplantation of iPS cells into nude mice resulted in tumors containing a variety of tissues from all three germ layers. Following injection into blastocysts, iPS cells contributed to mouse embryonic development. These data demonstrate that pluripotent stem cells can be directly generated from fibroblast cultures by the addition of only a few defined factors.

or by fusion with ES cells (Cowan et al., 2005; Tada et al., 2001), indicating that unfertilized eggs and ES cells contain factors that can confer totipotency or pluripotency to somatic cells. We hypothesized that the factors that play important roles in the maintenance of ES cell identity also play pivotal roles in the induction of pluripotency in somatic cells.

Several transcription factors, including Oct3/4 (Nichols et al., 1998; Niwa et al., 2000), Sox2 (Avilion et al., 2003), and Nanog (Chambers et al., 2003; Mitsui et al., 2003), function in the maintenance of pluripotency in both early embryos and ES cells. Several genes that are frequently upregulated in tumors, such as *Stat3* (Matsuda et al., 1999; Niwa et al., 1998), *E-Ras* (Takahashi et al., 2003), c-*myc* (Cartwright et al., 2005), *Klf4* (Li et al., 2005), and β-*catenin* (Kielman et al., 2002; Sato et al., 2004), have been shown to contribute to the long-term maintenance of the ES cell phenotype and the rapid proliferation of ES cells in culture. In addition, we have identified several other genes that are specifically expressed in ES cells (Maruyama et al., 2005; Mitsui et al., 2003).

In this study, we examined whether these factors could induce pluripotency in somatic cells. By combining four selected factors, we were able to generate pluripotent cells, which we call induced pluripotent stem (iPS) cells, directly from mouse embryonic or adult fibroblast cultures.