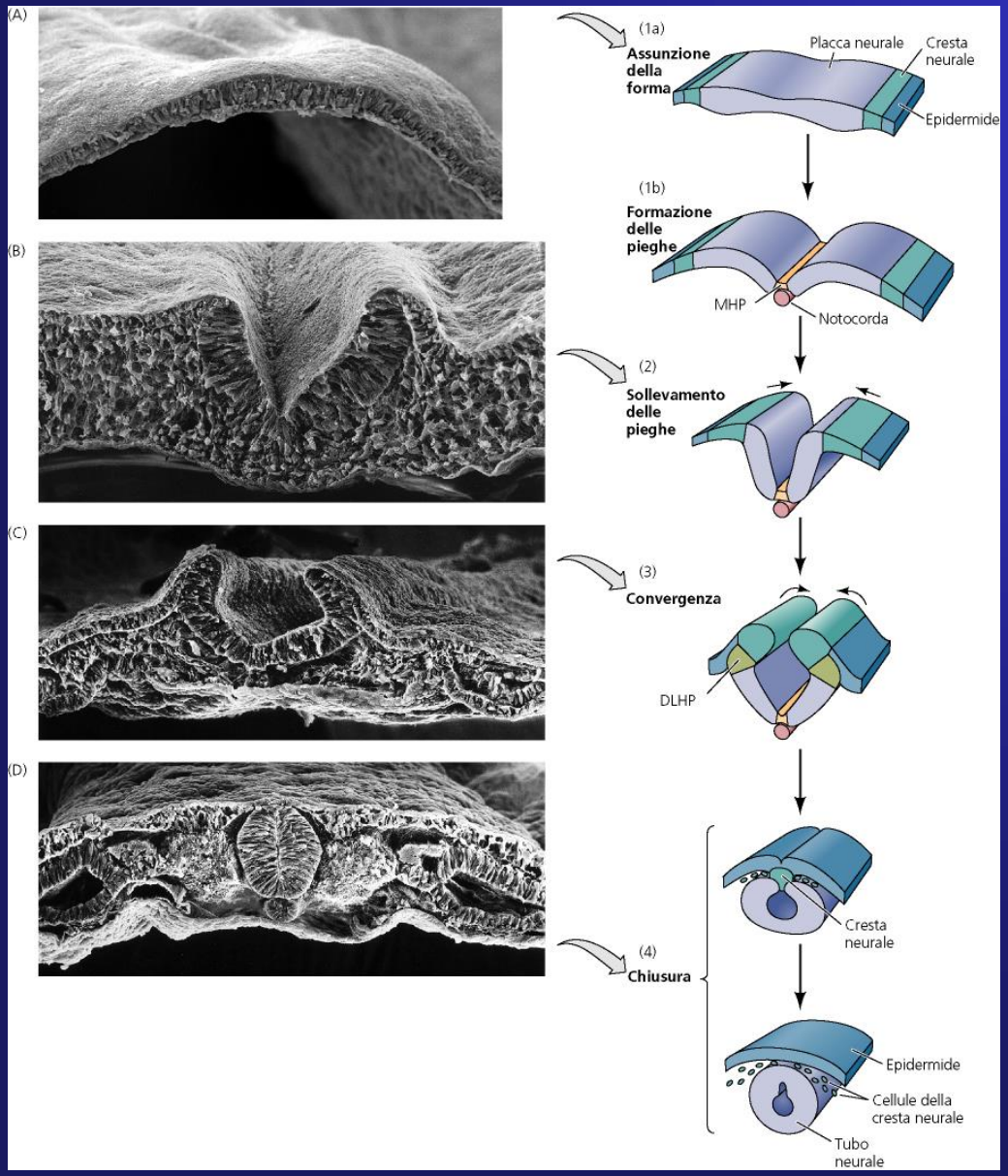
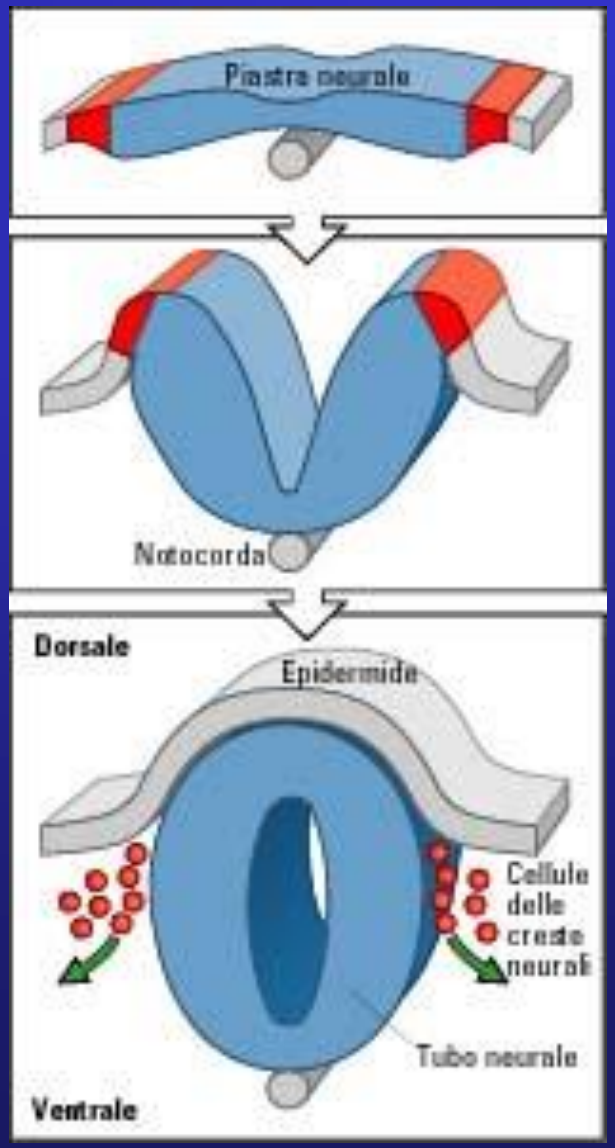
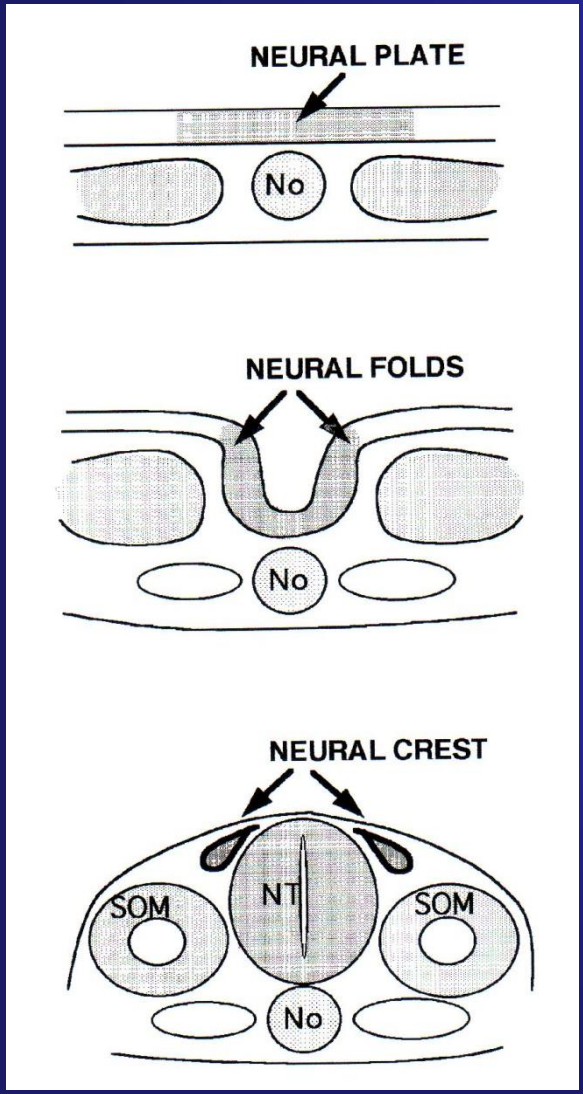
Cellule della cresta neurale

Origine delle cellule delle creste neuronali







Le cellule delle creste neurali vengono ad originarsi da precursori che condividono un iniziale percorso con i precursori del tubo neurale

Le NC vengono determinate e segregate alla chiusura del tubo neurale

Regione anteriore

Regione posteriore

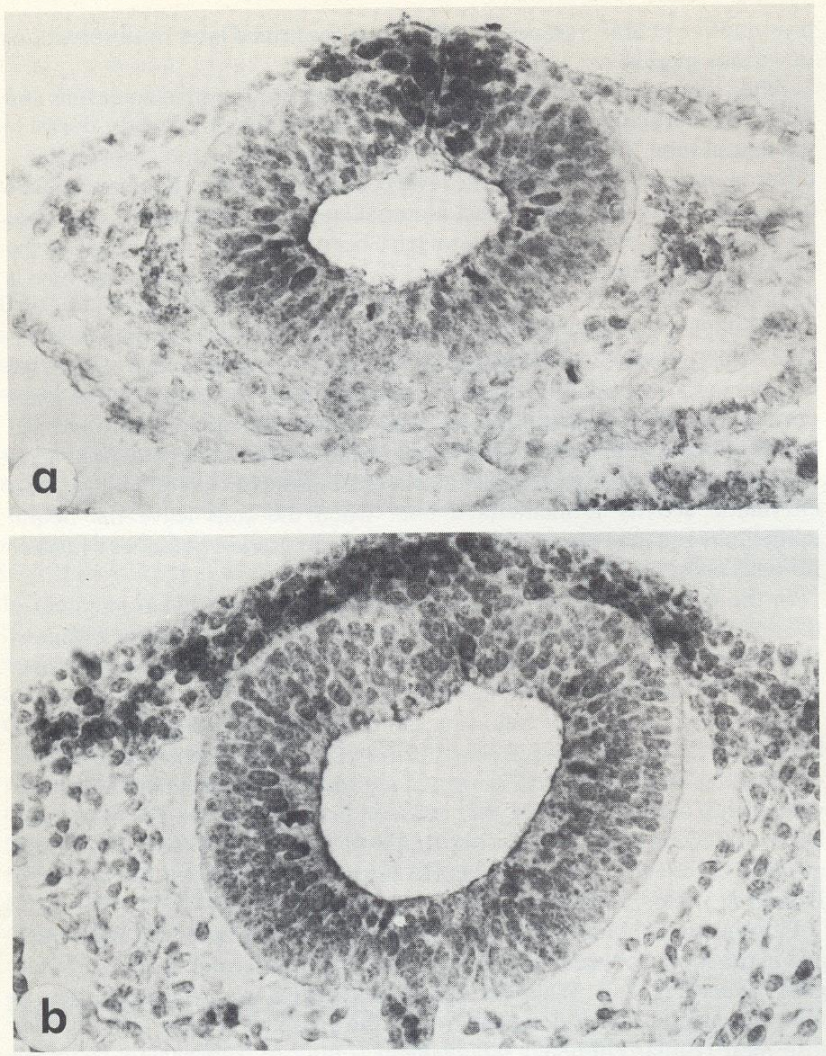
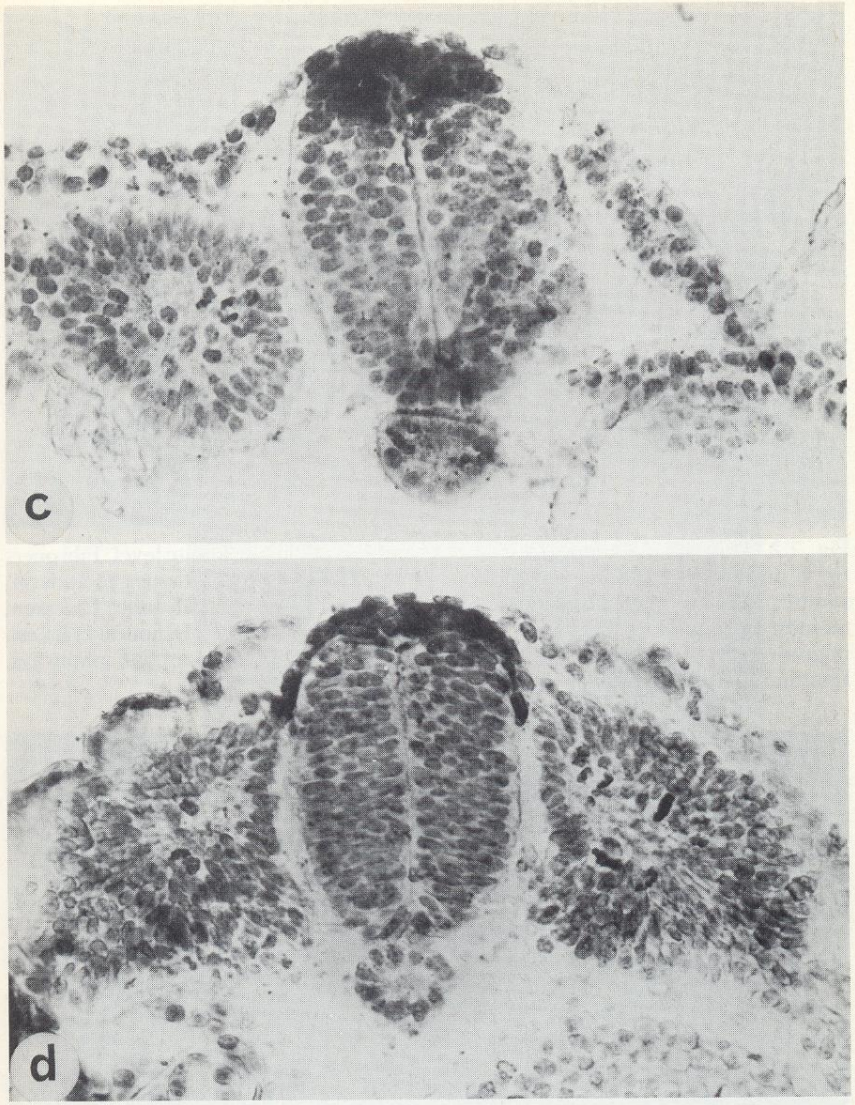


Fig. 2.1. The neural crest cells during (a) and after (b) closure of the neural tube at the mesencephalic level; at the trunk level, in (c) the crest is not yet individualized; in (d) crest cells are in the process of migration. Method of Karnovsky and Roots (1964) and action of iso-OMPA, an inhibitor of non-specific cholinesterases. (×240)



Classificazione sulla base della localizzazione della cresta neurale lungo l'asse antero-posteriore

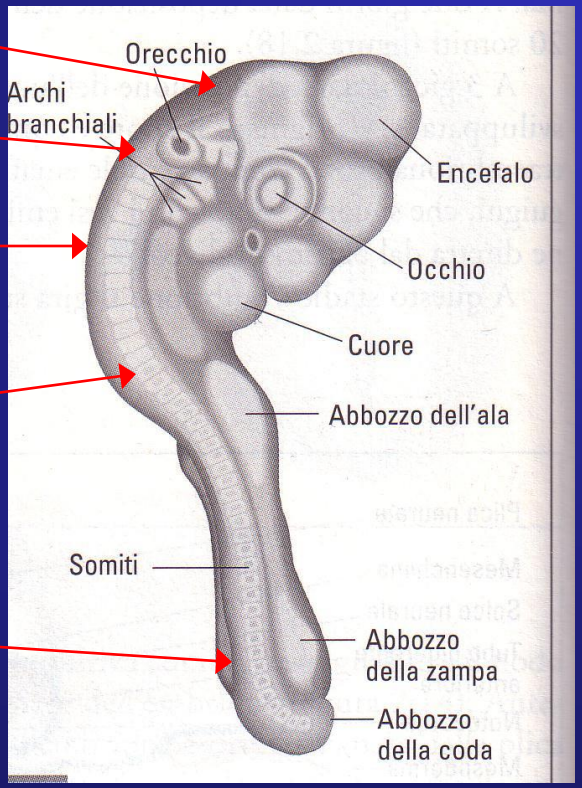
CN cefalica

CN cervicale

CN cardiaca (I-III somite)

CN del tronco

CN sacrale



I derivati cellulari delle creste neurali

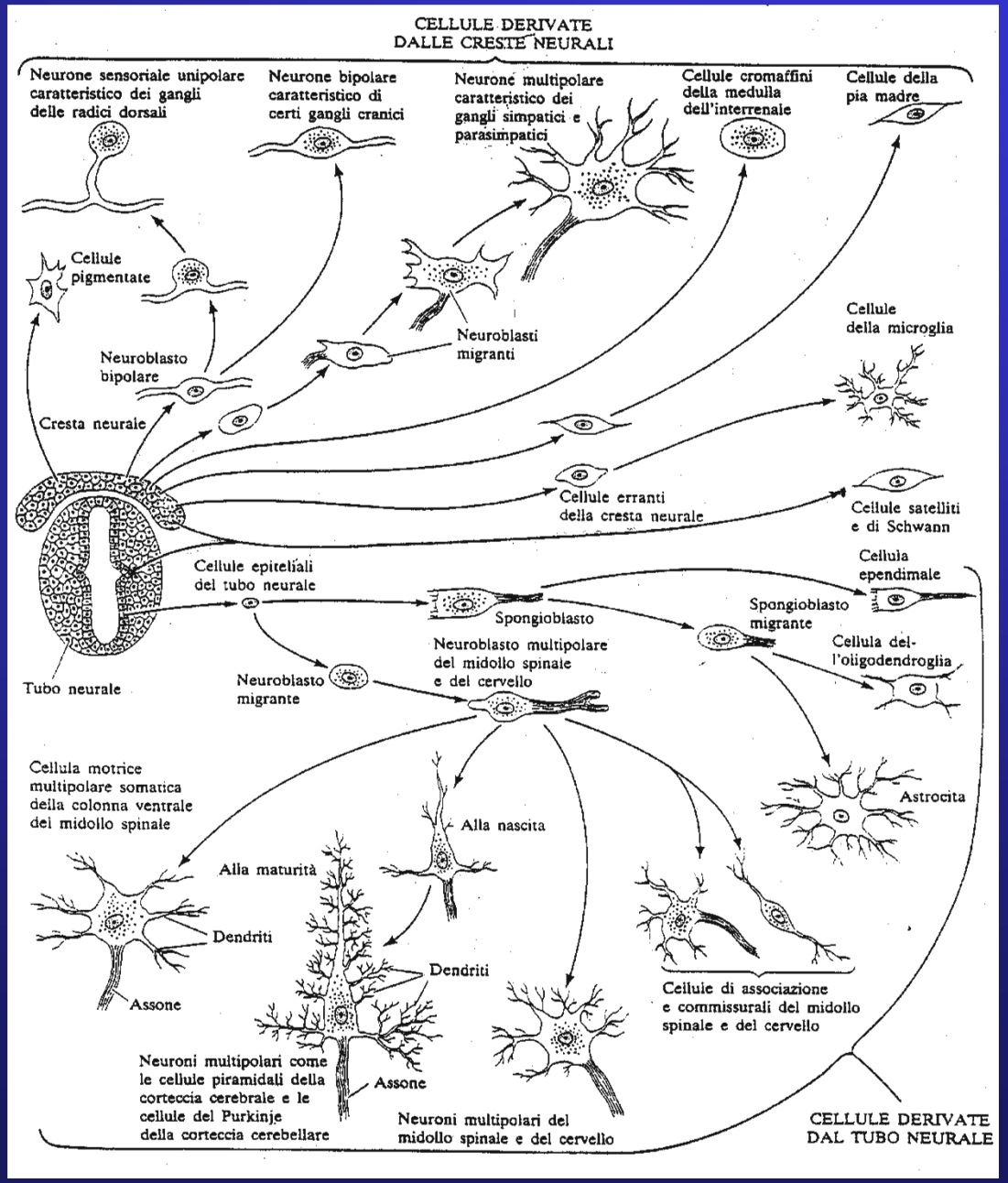
- Sistema nervoso periferico:
  gangli spinali
  gangli simpatici
  gangli parasimpatici
  Cellule di Schwann

- Cellule pigmentate:
  melanociti

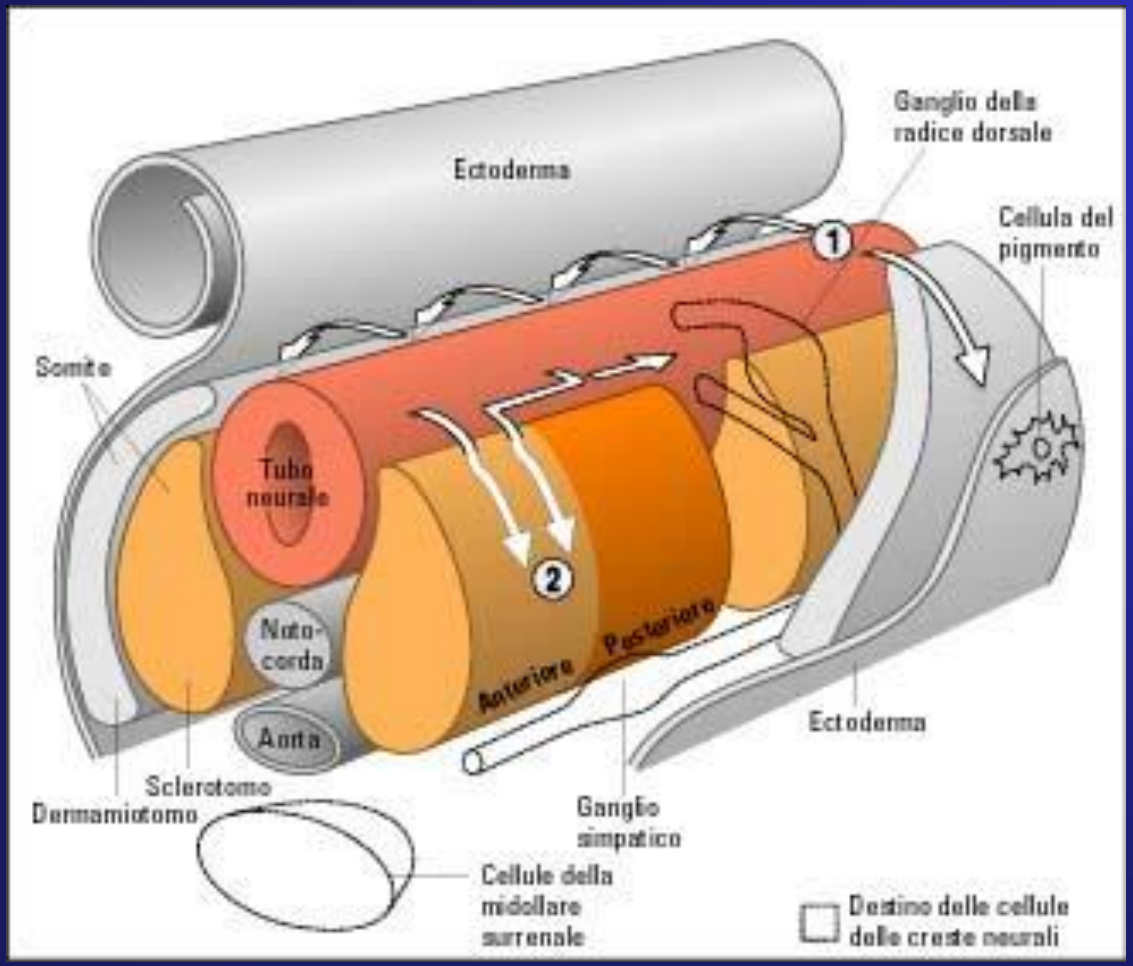
- Derivati endocrini:
  midollare del surrene

- Derivati mesenchimali:
  cartilagine ed ossa della faccia

- Derivati connettivali:
  connettivo e muscolatura delle arterie
  endotelio e stroma corneale



Le vie di migrazione



DL: melanociti

LV: gli altri derivati

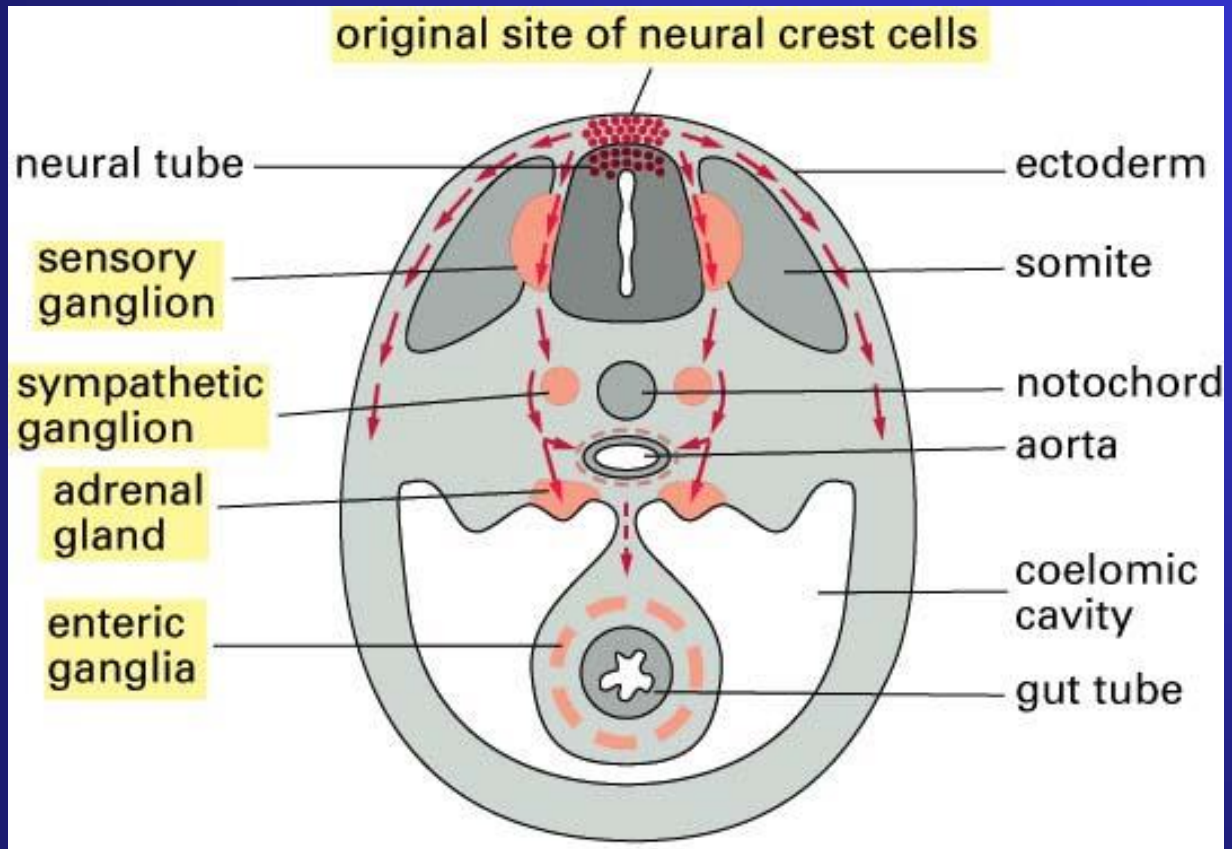
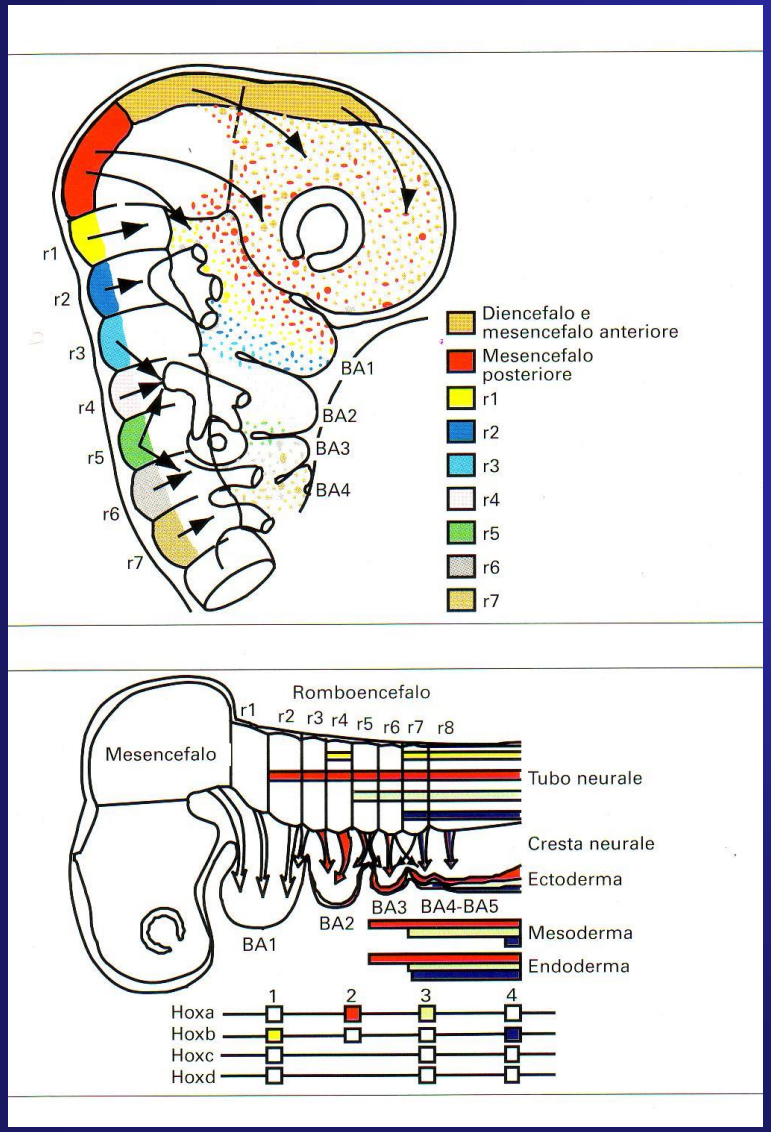


Figure 21–80. Molecular Biology of the Cell, 4th Edition.

Cresta neurale cefalica



Derivati:

1. mesenchima della testa,
2. neuroni e nervi cranici,
3. connettivo di timo, tiroide e paratiroide
4. cartilagine della mandibola e dell'orecchio interno

Le cellule della cresta neurale sono determinate prima della migrazione ?

La via di migrazione è dipendente da una precedente determinazione delle cellule ?

E’ possibile cambiare il loro destino differenziativo ?

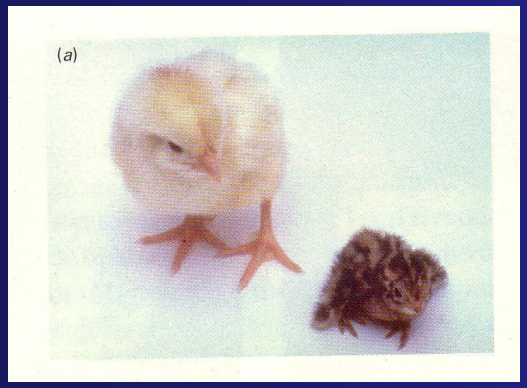
Come studiare le cellule della cresta neurale

- Uso di colorazioni vitali (es. rosso neutro)

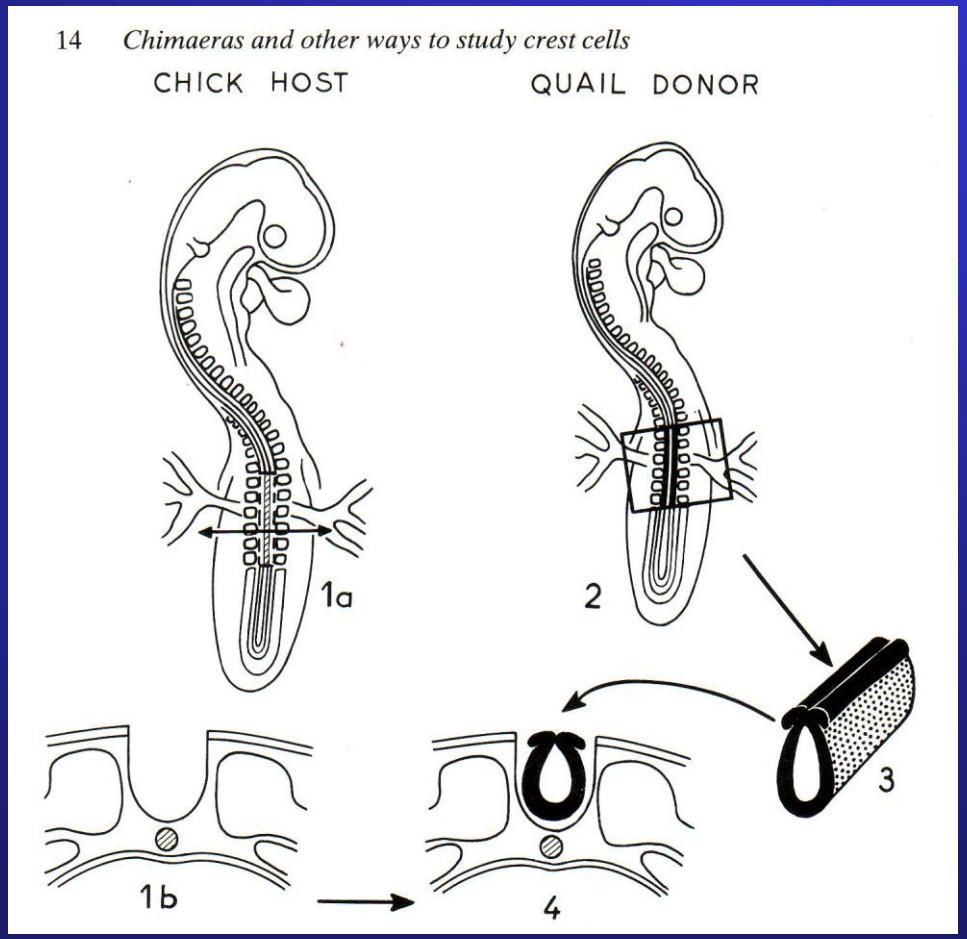
- Trapianti di cresta neurale sottoposte precedentemente a incorporazione di timidina triziata

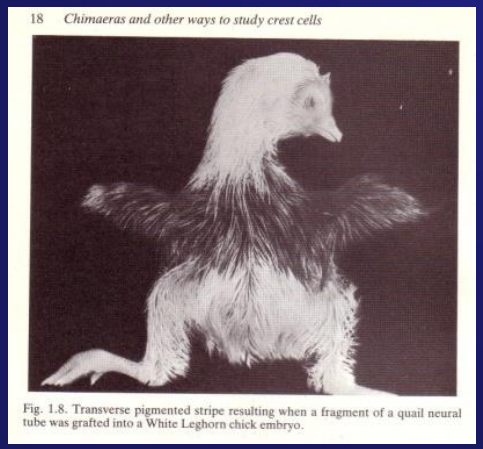
- Asportazioni di regioni della cresta neurale

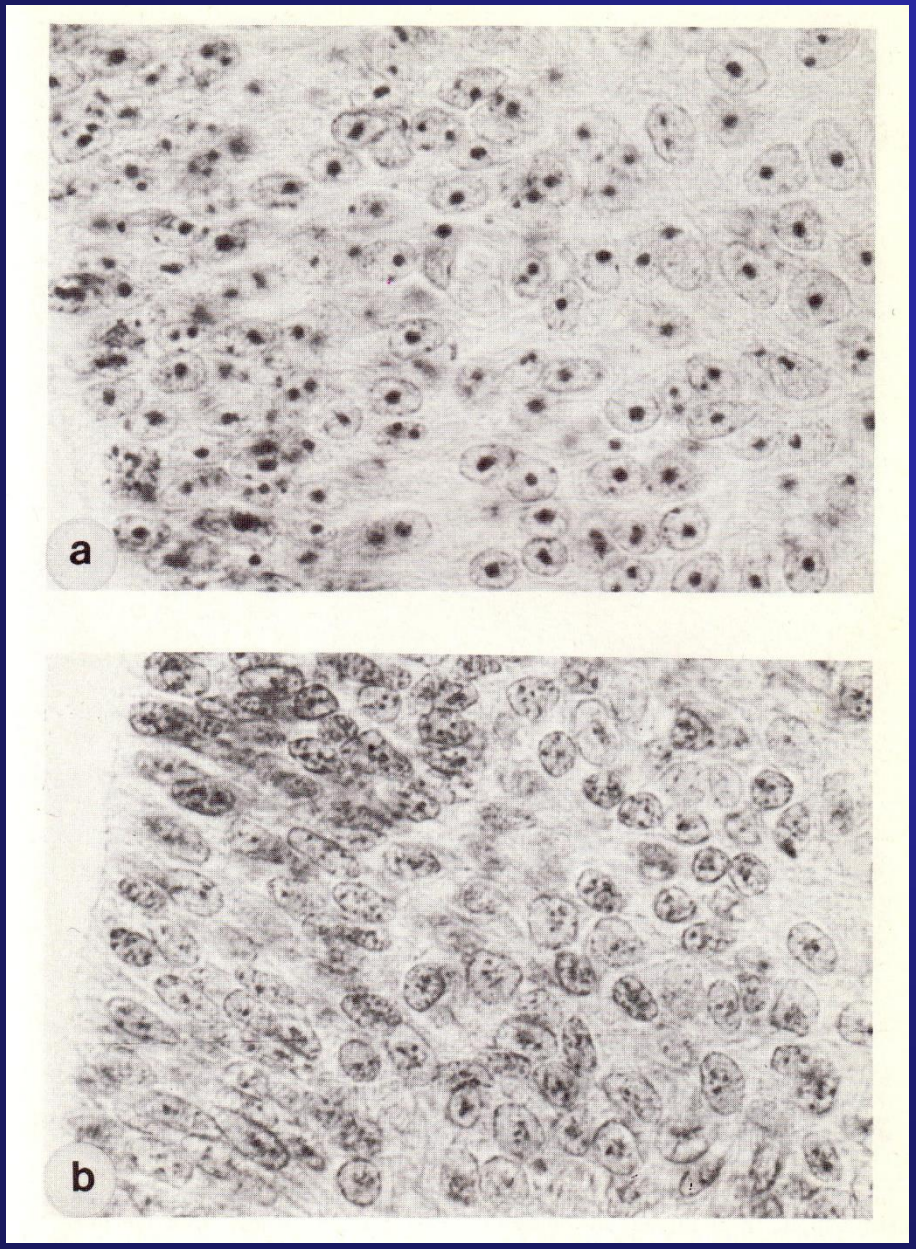
Gli ibridi quaglia-pollo

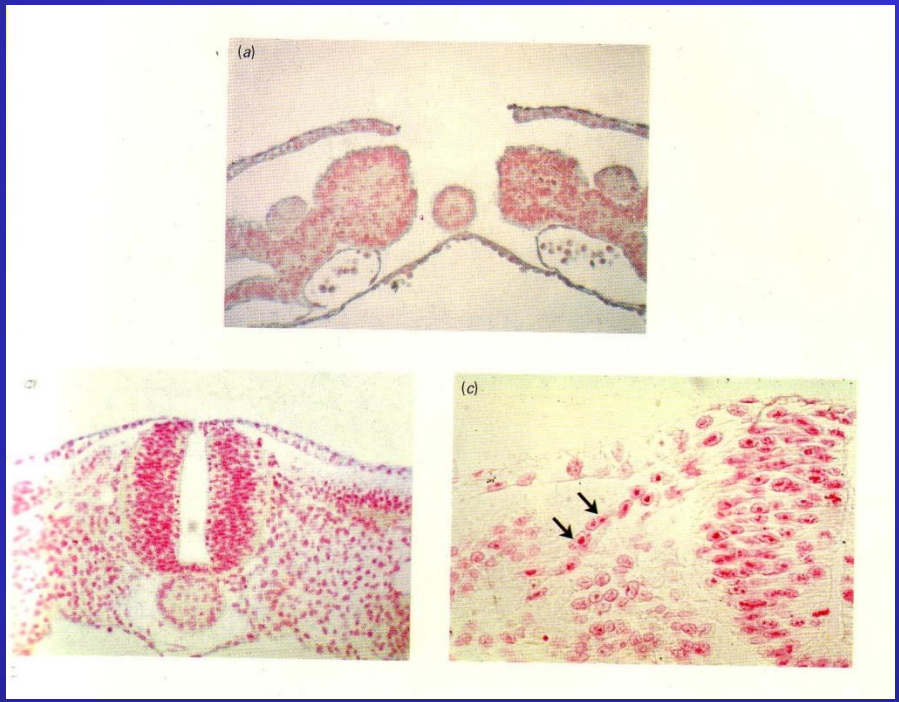


N. Le Douarin (1968)

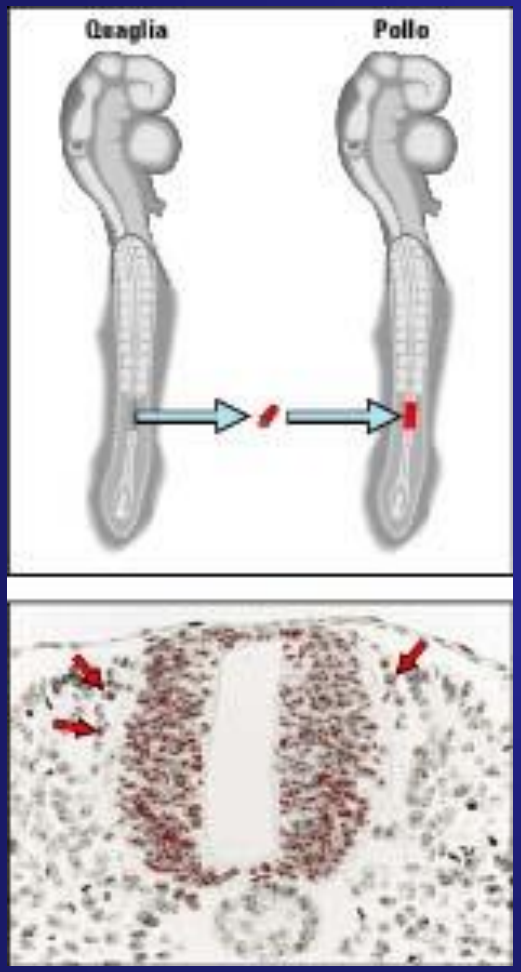








Colorazione Feulgen



1. Trapianti in regioni isotopiche

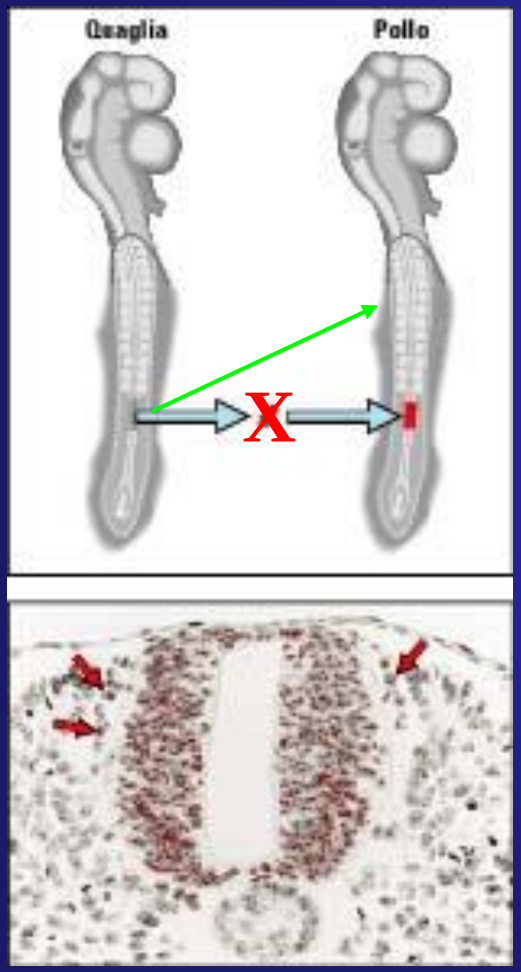
CN cefalica → Mesoderma e cartilagini della testa

CN cervicale → Gangli parasimpatici

CN cardiaca (I-III somite) → Derivati muscolari e connettivali delle grandi arterie

CN del tronco → Gangli simpatici e spinali

CN sacrale → Gangli parasimpatici e gangli enterici



2. Trapianti in regioni ectopiche (es. cresta neurale cervicale al posto della cresta neurale del tronco)

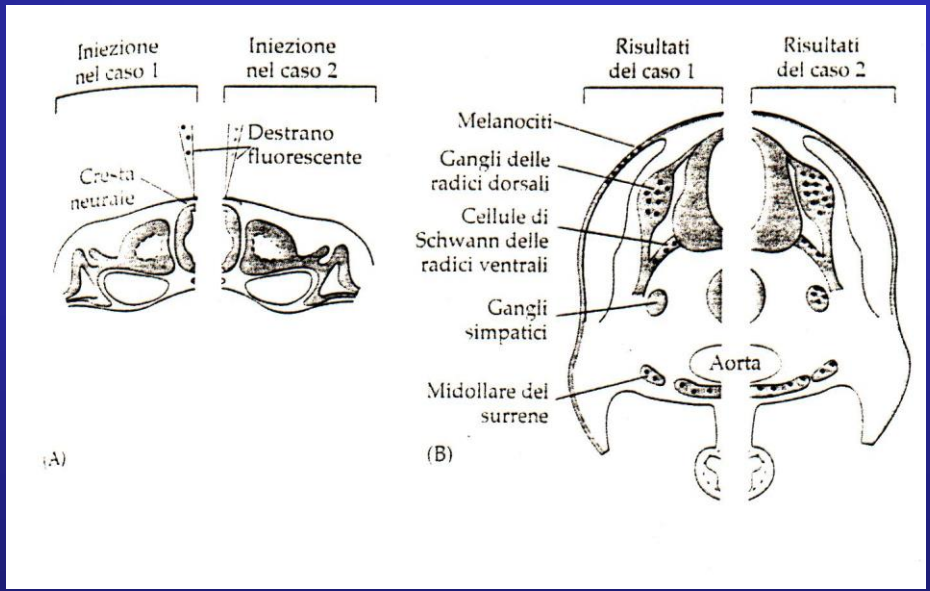
• I risultati ottenuti dimostrano che le cellule delle creste neurale non risultano determinate all'inizio della migrazione.

• Questa affermazione sembra non essere valida per la cresta neurale cefalica la quale risulta già determinata prima della migrazione

Ulteriori metodi di indagine

- Tecniche di immunocitochimica

- Microiniezione in singole cellule di destrano fluorescente



- Colorazione con un tracciante fluorescente (DiI)

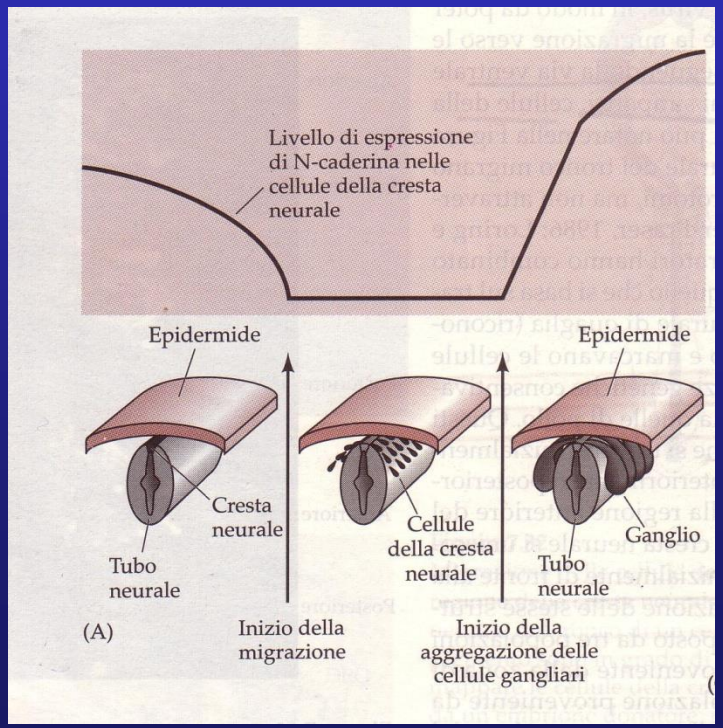
Da che cosa dipende la migrazione di queste cellule

- Le proprietà mesenchimali di queste cellule sembrano associate all'espressione del gene *slug*

- Disgregazione della membrana basale che circonda il tubo neurale

- Perdità di adesività (modificata espressione di molecole di adesione

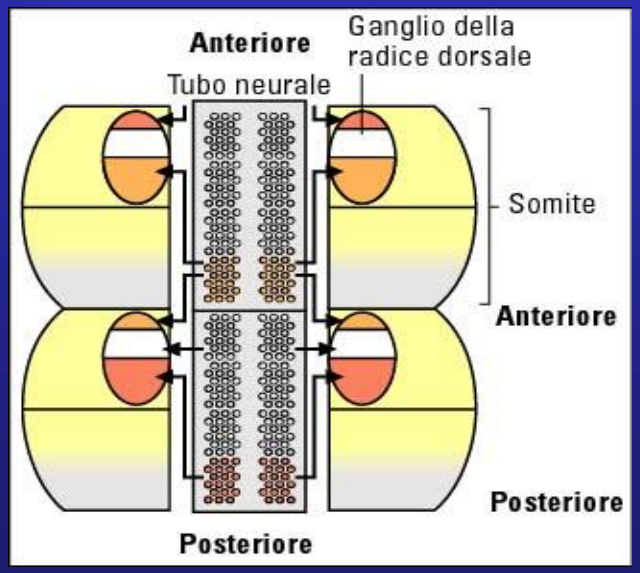
- Chemiotassi



• Ruolo della matrice extracellulare

• Substrati permissivi: fibronectina, laminina, collagene, alcuni proteoglicani

• Molecole inibitorie: alcuni proteoglicani, efrine, T-caderine



• Espressione di integrine specifiche (es. β1)

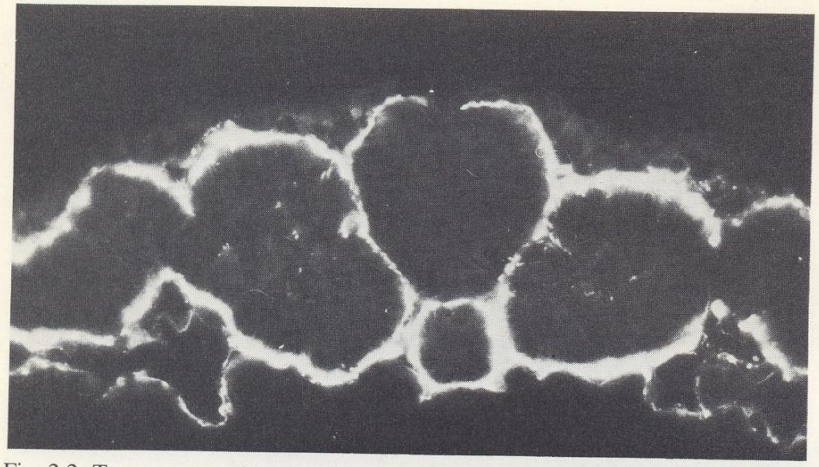


Fig. 2.2. Transverse section of a 15-somite embryo at the last somite level. Fibronectin is present as a basement membrane component of all the tissues (ectoderm

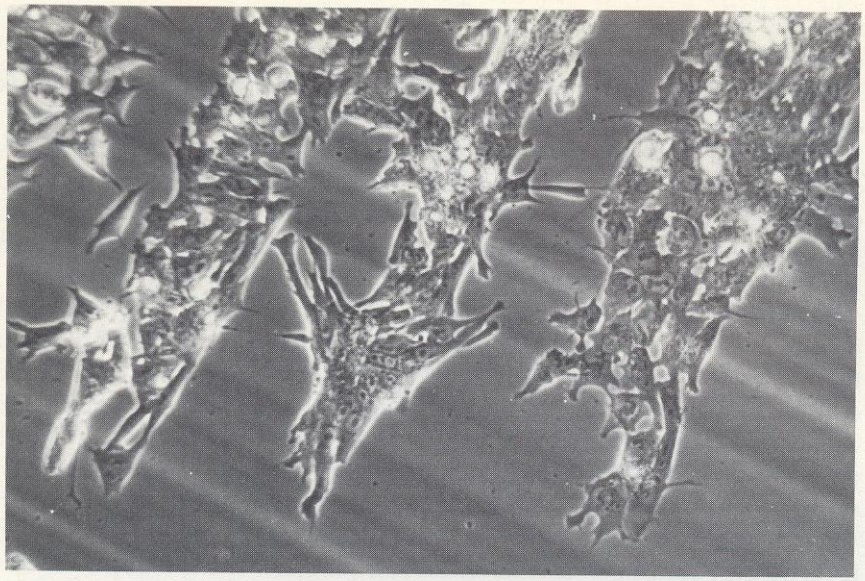
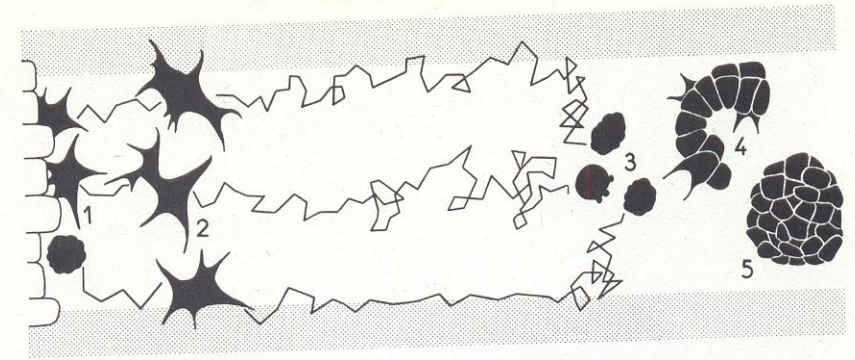
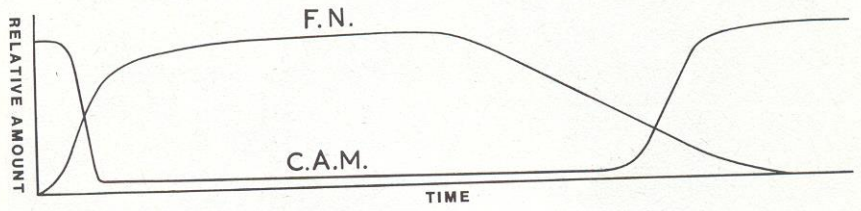


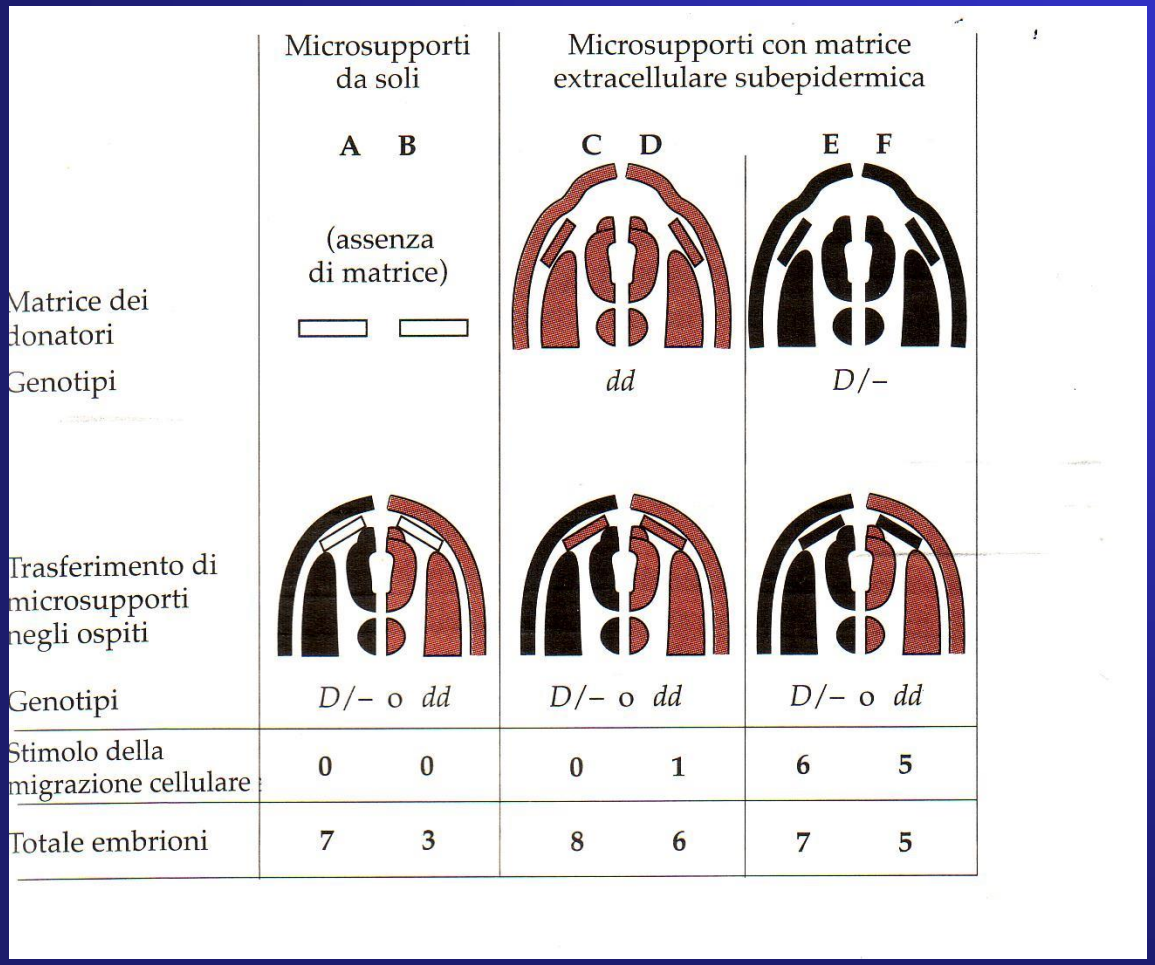
Fig. 2.18. *In vitro* culture of neural crest cells on a fibronectin substratum. Neural crest cells migrate as a quasi-confluent layer following very precisely the pathways containing fibronectin. (From Rovasio *et al.*, 1982.) (×170)

Substrato di Fibronectina favorisce migrazione





La ECM guida la migrazione corretta delle NC



	Microsupporti da soli		Microsupporti con matrice extracellulare subepidermica			
	A	B	C	D	E	F
Matrice dei donatori	(assenza di matrice)					
Genotipi			*dd*		*D/–*	
Trasferimento di microsupporti negli ospiti						
Genotipi	*D/–* o *dd*		*D/–* o *dd*		*D/–* o *dd*	
Stimolo della migrazione cellulare	0	0	0	1	6	5
Totale embrioni	7	3	8	6	7	5

(da Löfberg et al, 1989)

DETERMINAZIONE

1. Segnali locali provenienti dal tubo neurale e dalla notocorda

2. Fattori di crescita rilasciati e depositati sulla matrice extracellulare

